

AVIATION WEEK

JUNE 1, 1953

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50 CENTS



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The B. F. Goodrich expansion tube principle has the basic advantage that braking action applies equal pressure over the full circle of the drum, giving greater braking power, better load distribution. Today's B. F. Goodrich brake has a new, narrow entry tube

that gives even more braking power, with less drag.

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BECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Domestic

Standard DC-3 cargo transport with one engine replaced crashed last week while trying to land in heavy fog at Lambert Field St. Louis, killing four pilots, a stewardess and a mechanic. Air port officials say the Meteor Air Transport Co. plane was low on fuel and was having for a second try.

Public hearings on Kalam Finner Corp.'s contract for production of five-child C-119s at its Willow Run, Mich., plant are scheduled to open Jan. 3 before a Senate Aeronautics Subcommittee headed by Sen. Stenley Bridges.

Captain and copilot of a Boeing Air-liner G-45 were killed when the passenger transporter crashed and burned Nov. 12 in an electrical and wood storm 16 mi. east of Des Moines. The airliner was en route Chicago-Chicago, Wis., from flight.

Surveillance Radar (developed, in full production and first deliveries have been made to Navy and Air Force squadrons, Navy Bureau of Aeronautics announced.

Electronic simulator for the C-124A Chieftain (Aeronautics Week May 6, p. 77) has been accepted by USAF from Curtis Wright Corp.'s Electronics Division, company sources say. Contract for four units involves several million dollars.

Ralph G. Platt, a senior officer of the Cleveland News, was re-elected president of the Aviation Writers Assn. at the 1961 annual convention in Ft. Worth and Dallas. Other elected officers: Nels G. Beck, dean of Public College, East St. Louis, Ill., secretary; and Louis V. Spence, vice president; Albert Woodley Co., treasurer. Leroy Whitman, editor of the Army, Navy and Air Force Journal, was named first vice president; Mrs. Harland Page, editor of Coast Community News, America, Tex.; second vice president; and George F. McLaughlin, Jamaica, N. Y., historian.

Military Air Transport Service calls built its fifth anniversary today (June 11).

CAR hearing has uncovered no definite data to the study of a Western Air Lines DC-8B in San Francisco Bay Apr. 20. Eight persons were killed, two are dead.



HERBERT SECRET North American XF-108 jet fighter was quickly revealed for the first time when an early model of the plane was sent to young returned USAF jet ace Capt. Joseph McCaskey, Jr. (left) and Capt. Monte J. Friedman, Jr. (right) at the Pentagon. In the center is the latter's father, Col. Monte J. Friedman. The jet XF-108 was slated during an advance that

they had bought Mac-11s as high as 49,000 ft. Both are slated for summer posts in the center. McCaskey is credited with 16 Mac-11s and Friedman with 141. The first view of the new USAF XF-108 shows the craft's large wings with 45-degree sweep compared with F-105's 35 deg. McCaskey told us about lower than on the F-105. The XF-108 is designed to take a F-105A 117,

which made last year's Operating program were \$5,853,884, expenses amounted to \$4,927,094.

International

CF-104 deliv'ng jet fighters—designed by A. V. Roe (Canada) for a range of more than 1,300 mi. and speeds up to 1,700 mph—has been approved by the Canadian government for 1961 production, according to announced reports.

KLM Royal Dutch Airlines' Conquest Royal carrier, during an accident killed from Schiphol Airport at Amsterdam last week, killing a woman and child standing in a road near the field. Sixteen of 34 persons aboard the plane were injured.

Guinness, SIF-16, McDonnell F2H-3Bardonia and British Furry Gannets are being considered by Canada for its new aircraft carrier HMCS Bonaventure, under construction in a replacement for HMCS Magdalen. Approximately 120 planes will be bought for the carrier at a cost estimated at \$10 million.

Financial

Northwest Orient Airlines operating profit for April totaled \$315,993, compared with a \$373,952 loss during the



POWERFUL VAP FORTER, the No. 144 Sabre has been equipped on improving recent two engine improvements give Sabre 241 greater speed, more range

CONTINUING DEVELOPMENT ON G-E J47 HELPS IMPROVE SABRE JET PERFORMANCE

North American F-86 Flies Faster, Farther

LIVE-CHANGING NEEDS of air combat have been met by important refinements and improved performance in the General Electric J47 turbojet—powerplant of the North American F-86 Sabre Jet. A glance at the MIG sky scoreboards attests to the F-86's past success, but now even better J47 engines are powering improved Sabre Jets in combat against the MIG.

MORE SPEED . . . MORE RANGE were necessary to keep the Sabre Jet's present superiority intact. So G-E engineers designed more efficient compressors, water/alcohol injection, and a total of 3000 design improve-



REINFORCED STATOR BLADES are inserted into compressor casing. This development reduces cut with air efficiency losses



J47 "HOT NOSE" is worked by six hand men compressors. Reinforced stator blades help eliminate icing problems

ments. Result? Greater thrust, lower specific fuel consumption at higher rpm—with no increase in engine flame size or weight.

CONTINUING IMPROVEMENTS have made the J47 America's number one production turbojet. Yet no G-E engine design is static. Even now, General Electric's vast jet engine facilities are using every means possible to make G-E jets more powerful, more reliable, and more economical than currently-produced engines. Progress is General Electric's most important product. General Electric Co., Schenectady, N. Y.

WHO'S WHERE

In the Front Office

Richard H. Clevering, former Washington manager for Allison Division, General Motors Corp., is now president of Bristol Corp., Los Angeles.

James W. Mason has been named vice president of Northland Aircraft, Inc. He succeeded C. E. Bensch, assistant vice president planning. W. J. Bensch, assistant vice president engineering, Dale Mearns, assistant vice president operations, and Frank J. Smith, assistant secretary.

R. F. Bond has been appointed vice president and general manager at Aircraft Bristol Division, Burbank, Calif. Solley S. Bond is new sales manager.

Bristol Corp. will enter July 1 as United Air Lines vice president-sales but will continue to serve the parent as a consultant. Martin Dahlen has been named vice president-sales at Aeromarine, Inc., The Beach, Calif. N. J.

Changes

Vice Air: M. B. Sullivan (SUN Bet.) has been appointed assistant general manager of Chance-Vought Aircraft Division, United Aircraft Corp., Dallas. Clifford E. East is now in charge of engineering. Herbert B. Tolson, who has retired.

Heath: W. F. Faye has been elected an executive and director of product design and mechanical systems of Spadco Associates, Inc., Nashua, N. H.

Debs: Thayer has been promoted to general operations manager of Philippine Air Lines, succeeding Walter L. Black. He is assigned to assume his duties as a pilot. Joseph Nelson is new general manager of Republic Service of Manila, Inc., managing Martin Lary, former president who sold out his interest in the corporation.

Edwin A. Koch has been named treasurer of California Control Aircraft.

Albert E. Smeas, Jr., has joined North American Aviation, Inc., as eastern general manager representative in New York to the Los Angeles corporation.

J. E. Brown has been appointed manager of public relations for Sport Corp. since Co. East has left N. Y.

Vale J. Flanagan has been promoted to industrial relations manager at Pacific Air Station Corp., Chino (Calif.) Division. Earl Helling, who has retired and general manager of the Hydrant Section, No. 1000, Bureau of Standards.

Frank H. Martin is new sales development manager of Eastern Air Lines. George W. Hartsel has been named administrative assistant to the vice president traffic and sales, replacing Elmer C. Schick, resigned.

Charles F. Shery has been named sales director of National Airlines.

V. Z. Stark has been appointed assistant general manager at Ford Motor Co.'s Aircraft Division, Chicago.

Jack Schuchman is new engineering manager of Flight Refueling, Inc., Dallas, Conn.

INDUSTRY OBSERVER

Recent collisions of a Republic F44 and a Wright Field B-37 over Long Island indicated during experiments with new experimental design to convert F-44 into a four-engine fighter. The new equipment allows fighters to the south of the wings and would prevent aerial refueling operations, according to reports.

Accidental mixture of liquid oxygen and diesel during "testing off" operations to install a fuel feed line for the Bell X-2 rocket motor before actual launching from a B-37 is blamed for the fire that resulted in loss of the seventh plane and two Bell employees (Aviation Week May 15, p. 9). A second X-2 is nearly finished.

Rocket breakup of a Panavia H-21 helicopter on the ground at Mojave, Pa., was believed due to ground maneuvers, which took up a cooling on friction in a point where both rotors were mounted.

Various precautions apparent on the upper wing surface of the Boeing B-47 jet bombers at Caswell AFB (Aviation Week May 25, p. 10), are designed to improve the surface even the wings at high speeds and to make possible higher speeds than those for which the airplanes originally were designed. The precautions are thin metal strips protruding up about one inch from the surface of the leading edge, in multiple rows, to prevent the wings from the attachment of the exhaust nozzles. They have been incorporated in all the Boeing B-47s built at Wichita.

Production version of the Martin Marietta B-54A pilotless bomber features a high wing instead of the mid-wing design on experimental models. Other features on the models now being off the Martin production line include nose height in the vertical tail fin, dihedral in the horizontal tail and a "dumbbell" "belly" formed at the intersection of tail surfaces.

John Terry, West Coast designer of the all-metal Sky Scooter two-place plane, is polling aviation people to test the market potential of selling a knock-down Sky Scooter kit to trade schools and plane enthusiasts.

Modification line at the Chance-Vought plant is set up to handle the new J47 engines for the F-86. The plant is now being used to handle the J47 engines for the F-86. The plant is now being used to handle the J47 engines for the F-86. The plant is now being used to handle the J47 engines for the F-86.

An auto-rotor landing from nearly 45,000 ft. was accomplished by Bell test pilot Elmer J. Smith recently in Bell's XH-15 high-altitude helicopter which engine surge developed and he had to cut off power. In a high altitude test, he spotted down on a Hawaiian glide, making what is believed to be the largest auto-rotor descent in history.

He then flared out for an engine landing at Bell's helicopter test Ft. Worth.

Rotor Craft Corp. of Glendale, Calif., has purchased U. S. and foreign patents at Los Angeles Helicopter Co., Los Angeles, and now expects basic patent applying to rigid "axi-swing" rotor. One advantage of the rigid blades in transport helicopter, it is pointed out, would be that passengers could board and disembark in safety while the rotor continued to turn.

Chance-Vought thinks that the retractable tractor on Republic models in test and training versions has made possible a large saving. For a 100-hp, light engine of such a vehicle, it is not yet ascertainable, about 200 would be expended. But the Republic is cutting the number of rotors needed for such a program to 50. Second vehicles have been received specially designed for damage after flights at subsonic and supersonic speeds, because of the turbine gas and dust particles with which they are hit. The test and training rotors is equipped. Up to 10 flights have been made with a single Republic.

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Washington Roundup

Williamsburg Fiasco

Aircraft industry leaders who expected to get authentic details of the new aircraft procurement picture from Defense Secretary Charles E. Wilson and Air Force Secretary Harold G. Tamm, at AIAA's Williamsburg, Va., meeting were disappointed. Wilson and Tamm gave no details of their new aircraft program and offered only a statement that the aircraft industry had nothing "to worry about" for at least 18 months.

Wilson and the future of the aircraft industry beyond that would depend on the outcome of the review of service roles and missions scheduled for this summer by the new Joint Chiefs of Staff. Tamm spoke briefly, but little to say. Roger Lewis, Assistant Air Force Secretary for Procurement, and John Fisher, Assistant Secretary of the Navy for Air, also appeared at the Williamsburg meeting.

Silur on Research

Some industry leaders were disturbed by Wilson's continued reference to technological research as "background glaze" and his implication that much of it wasn't really necessary. The industry feels that Wilson also furnished broad hints during a period when the aircraft people felt they with specific questions on their minds.

Wilson's Future

Feeling is growing in Washington that Wilson probably will become the first political casualty of the Eisenhower Administration. The reason primarily is because of his determining efforts with Congress, rather than defense policy.

Scrutiny of both parties are becoming increasingly difficult over Wilson's attitude on Capitol Hill and his ever more distant Senate hearings. There is growing feeling that both Wilson and Kees are doing a poor job of explaining their defense policy and are leaving little openings for critical counterattacks. Both seem to avoid questioning by either senator or reporter trying to find out what the new policy really means. Wilson's relations with the Pentagon's press corps also are at a low ebb.

Air Power Support

Republican Administration is expected at the strong public and congressional opinion directing support of proposed cuts in air power. Washington's new most influential daily newspapers supported Eisenhower in the election, now have taken strong stands against Wilson's proposed cuts, and some Republicans in both the House and Senate are publicly opposing any reduction in military air power. Republican congressional leadership will face a tough fight to keep the party in line when the new budget comes up for a vote.

Air Force Position

USAF's best place on agenda reveals against the new defense budget and was mirrored in the statement given by Rep. Sam Yorty by its legislative liaison office considering rates of Wilson's considerations. The statement was headed at USAF's operating level as a routine

(congressional) inquiry and not closed at the air staff level.

USAF's older statements, such as retired Gen. Carl A. Spaatz and retiring Chief of Staff Gen. Hoyt S. Vandenberg, are expected to spark opposition to the new defense budget.

No Budget Yet

Actually the new defense budget was whipped through with such speed that USAF and Navy have not yet had time to draft a detailed aircraft procurement program tailored to the new dollar ceiling. Defense Undersecretary Roger Kees told the Senate Appropriations Committee last September, transports, trainers and liaison planes will take the heaviest cuts.

Strong JCS

Washington observers believe the new Joint Chiefs of Staff will prove to be a strong counterweight with Gen. Matthew B. Ridgway leading the Army, Adm. Carl A. Doolittle at the Navy and Gen. Thomas H. Dyer at the Air Force.

Big question stands is the new chairman-designate Adm. Arthur W. Radford, who in 1949 called the USAF D-36 program a "billion-dollar blunder" and urged USAF to buy B-49 jet flying wings at a time when giant jets were passing the aircraft too unstable for a bombing platform.

Radford is a better fit of the USAF's strategic bombing concept and an ardent advocate of the super-heavy B-36 jet, force for the delivery of atomic attacks. Washington observers are watching to see how many of Radford's former attitudes will appear in the service roles and missions review he will conduct this summer.

B-36 Improvements

Details are a legitimate military secret, but B-36 performance has improved considerably since the 1949 investigations. Addition of several kinds of equipment and new combat techniques have combined to keep the B-36 as effective weapon and give it a useful combat life of at least several more years before the first is phased into use as a target tanker to reduce jet bombers. Current war has built about 100 B-36s and USAF feels the program was a sound investment.

Nike Nonsense

Army is keeping performance details of its Nike anti-aircraft missile under security wraps, but Pentagon has been known how it intends to keep the American people from knowing how little this missile offers for defense against enemy atomic bomb attacks.

Army is spending millions to buy and equip Nike launching sites around key U.S. cities, but the Nike does not have sufficient range to reach enemy locations before they deliver an attack with guided bombs before World War II range. Nike's range is marginal even against conventional V-2-like bombers dropping conventional high explosive bombs. Technical observers regard Nike as a step forward toward an effective anti-aircraft missile but still far short of a sensible study for effective tactical operations.

—Washington Staff

AVIATION WEEK

Air Power Future Awaits JCS Meeting

- Key West-type conference will review defense picture, assign roles and missions, study plans and weapons.
- Actual aircraft procurement spending during fiscal 1954 appears headed for same level as fiscal 1953.

By Robert Hies

Potential level of U. S. military air power will be determined by a review of the active defense picture to be conducted by the new Joint Chiefs of Staff during the summer and early fall.

This study will include a Key West conference-type of assignment of service roles and missions plus an intensive and detailed study of strategic plans, air weapons, mobilization requirements and defense production programs. The study will evolve the fiscal 1955 Defense Department budget and the fiscal 1956 U. S. military effort for the next three years.

Adm. Arthur W. Radford has been nominated Chairman of the JCS Other agencies USAF, Gen. Nathan Twining, Navy, Adm. Robert B. Carney, and Army, Gen. Matthew B. Ridgway.

Pending outcome of the study, Defense Secretary Charles E. Wilson has decided to slow the pace of aircraft production and USAF's budget to reach a goal of 120 combat wings by 1955.

This compares with the Truman Administration goal of 120 combat wings plus 70 more carrier wings by the same time.

• Cash Outlay—Since the revised Republican Defense Department budget (House version May 25, p. 16) was whipped through the Defense Department and National Security Council so fast that even the Joint Chiefs of Staff are not yet the day before it was submitted to Congress, it is difficult to find firm outlines of a detailed aircraft procurement program in the Pentagon.

It now appears that actual spending for aircraft procurement during fiscal 1954 will be about the same as during fiscal 1953.

Wilson testified before the Senate Appropriations Committee that USAF actually will have spent approximately \$4.6 billion for aircraft during fiscal 1953, which only met needs. This compares with \$4.5 billion in fiscal 1952 and \$7 billion estimated in the Truman budget for fiscal 1954, indicating that any aircraft procurement program for fiscal 1954 will involve reductions

spending from \$700 million to \$300 million from the Truman budget program.

Wilson agrees that all actual cash outlays from previously appropriated funds to the industry for aircraft deliveries and new defense items are approximately equal.

• Deep Shock—Wilson is imposing his big cut in the procurement appropriations request for fiscal 1954, slashing from \$6.6 billion to \$3.4 billion. This plan apparently is based on the following assumptions:

• USAF will have 122 billion to finance aircraft production during the next three years. This includes \$19 billion in aircraft funds from previous appropriations (mostly obligated but not yet spent) plus the \$3.4 billion for fiscal 1954. This is expected to finance aircraft production at a rate of about \$7 billion annually for the next three years.

• A further decrease in aircraft production by jettisoning the aircraft industry back on a normal tempo of 40 to 60 work weeks, and eliminating extra shifts and overtime.

• Major delays in aircraft production schedules during the next two years while new models are being brought into production.

• Consolidating expenditures that already are underway in USAF. This will reduce spare parts requirements through more efficient requisitioning procedures and greatly reduced jet engine acquisitions resulting from longer

service life, improved field maintenance techniques and use of surplus in the aircraft supply pipeline.

• Elimination of some aircraft which are considered to be of marginal military value.

• Elimination of some of the Eisenhower Administration's basic philosophy of setting down for a long, steady path that will maintain some element of arbitrary posture over an indefinite period of time rather than a limited commitment to meet a specific crisis.

• Critics of the Eisenhower defense program based their attacks on the fact that it procures items will not meet a major role in the immediate future and ignores the sustained bombing of the Soviet Union's military bases to that point where it soon will be capable of delivering a crippling attack directly on U. S. production centers from aircraft and submarines.

USAF Challenge—In a Pentagon press conference and testimony at Capitol Hill, Wilson indicated that what he actually means by "testing lead time" on aircraft production contracts simply is reducing the interval between delivery of aircraft and delivery of completed aircraft.

He believes that this actual rate he intended now because the aircraft industry has neglected its ability to speed up its production period. However, he admits that "lead time" still will be a critical factor in bringing new types of aircraft through their development cycle into production.

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USAF Strength

Air Force now has a strength of 103 combat wings but 18 of these are fully equipped with combat aircraft, according to Defense Secretary Charles E. Wilson.

Rep. Henry Smith, chairman of the House Armed Services Committee, told reporters after a White House budget conference that the Air Force now has 75 combat wings equipped with modern aircraft.

Polish Pilot Describes Improved MiG

By William J. Connelley

Los Angeles—Lt. Francis Jurecki, Polish air force pilot who escaped to America, says he has flown the MiG-15, but says he has not flown the improved MiG-17.

He listed these improvements in the new MiG, apparently the same model the Communists have been using in Korea fighting for more than a year:

- New gunpoint, with thrust up from 4,740 to 5,600 lb.
- Aileron boost.
- Improved gunpoint gauges.
- Radio engine.
- Radio altimeter.
- Master beam receiver.
- Better automatic (the one-77 mm. and two-23 mm. cannon combine two gun barrels in MiG-15).
- Modified cockpit.
- Stronger construction.

In response to American Warplane inquiries, Jurecki disclosed that his squadron received 14 of the new-type MiG-17s recently. The young, five-ferret and the second Polish pilot he escaped to Denmark, Maj. 20 in another MiG was from the same squadron and presumably flew the same model MiG.

"Many more will follow," he predicted, adding that several pilots tried to escape before he did but were shot down.

Polish Pilot-Jurecki told of the control system the Russians had established in an effort to prevent such escapes. He said all flights must be cleared with the control center at Warsaw 24 hr. in advance and are conducted in a scheduled way. Two Russian-jet aircraft were on alert at all times to scramble after any aircraft which leaves its assigned zone.

"They shoot down any pilot

plane," Lt. Jurecki said through an interpreter.

• **Flight to Freedom:** The Polish pilot said he planned his own escape in violation of the flight but denied that he received any financial offer from American sources.

"I did not even know of any such offer," he asserted.

Jurecki said he learned he talked he pretending to have trouble with his landing gear and was authorized to return home after three days in the last ship MiG-15 flight training was from the field, he flew over a Russian base on the Baltic, 60 mi west of his Polish station, dropped his tanks in the field there and headed for the Danish base on Bornholm Island.

He was chased by other MiGs, he said, and Danish vessels on the Baltic later reported he was fired upon, although he was certain of his escape.

He said he was leading a U.S. base and was surprised to find himself in Danish custody.

• **Present Position:** In describing the Russian-jet fighter facilities, Jurecki and the MiG landed near the air.

He said he had heard of nerve-damage difficulties which caused an uncomfortable open but had encountered no such trouble himself.

Pilots in his squadron, according to Jurecki, are under the impression the MiG-17 is the first fighter aircraft ever built. The Russians have built more than 100,000 since the war.

• **U.S. Documentation:** The Polish first-hand report was in Los Angeles on a tour at North American Aviation's 1-36 plant.

After completing public relations, he spent some time talking with North American designers. Jurecki was accompanied by an Air Force press officer which included Col. Francis S. Ghera.

Col. Ghera and the Air Force were taking Jurecki on a tour of U.S. bases and plants "strictly for documentation."

He said there are no plans for the Polish base to check out as a P-8 in the immediate future.

• **Red Training:** The 21-year-old lieutenant said he had a total of 150 hours of flight, of which 50 was in the MiG-15. Prior to checking out, he trained in a two-place version of the MiG. The MiG he flew to Denmark was the latest model in Poland, although he believes newer models are in training elsewhere.

He said he despised the Polish because of the nationality issue in his country under the Russians. "We never knew what tomorrow might bring," he commented. Jurecki said his final decision to flee was made after he was asked to do overnight espionage work against members of his own squadron.

He said he was sure the Polish air force "drawn to the lowest level—reluctant, this squadron level," he reported.

He said he was sure the Polish air force was given very complete information on allied aircraft, including their size, armament and strength. Russian reports told of many MiG victories over B-29s and other bombers in Korea, Jurecki said, but no mention of the MiG-17 or the fighter's combat with the F-86.

He said he definitely had been told Russians were using MiGs in the Korean fighting. At least one MiG-17 was shot down, he said. Warsaw is a victim of the Korean war, according to Jurecki.

• **Improved British Sight:** Concerning the MiG's gunpoint, he said it was "improved." He said he had seen a British sight which the Russians had improved. "He described his own as a Mach 32, 750 mph. fighter with a service ceiling above 16,000 ft. It does not have elevator boost," he said.

Temco Fights for Slow Cutbacks

McCulloch says air contracts should be decided on basis of efficiency, with preference to firms in aviation to stay.

By Alexander McNulty

Dallas—A major Southern Aircraft airplane producer, long noted for low-cost production, has launched a vigorous campaign to get "real economy" in the Defense Department's proposed aircraft procurement cuts.

Robert McCulloch, president of Temco Aircraft Corp., told *Airweek* of Texas in an exclusive interview that he has a counter proposal that cuts be determined on a production efficiency basis, with the most efficient companies being kept in business.

Whatever there is a choice between equally efficient manufacturers, McCulloch believes the contract should be awarded to companies with the most money to size things that are with other production lines.

He also has some ideas about more efficient ways of contract termination that he feels would give the government more for its investment.

• **New Contract:** McCulloch hurried to Washington last week to give his views to top Navy officials, before his company in the Navy's "small aircraft producer of a complete airplane, the McDonnell F-310 Delta jet fighter. The Temco proposal says the contract must be terminated under the plan announced by Defense Secretary Charles S. Wilson to end all second source airplane production.

Temco who has in production at the plant near Dallas two foreign orders for Boeing B-47 jet bombers and wing for Lockheed P-2V patrol bombers.

A recent analysis showed his company is producing those items at about half the standard industry cost per aircraft. McCulloch says he has full, distinct and adequate system ready to stretch to other complex assemblies. A recent production cost estimate for the small aircraft program was \$40,000, an Air Force industry source said.

• **Warning:** Production-low cost work at Temco is a continuation of what happened during World War II when it operated as a North American Aviation plant, with McCulloch as general manager. In 1945, the plant finished 131 Mustangs at the rate of 18 a day plus 12 AT-6 trainers a day, although only 5% of the complete airplanes were subcontracted outside the plant. McCulloch has predicted the Mustangs down to the lowest U.S. need for large scale production in the year, 3,500 per day.

If Temco can sell the North American



McCULLOCH. Fought for efficiency.

on Division that it was in World War II, it wouldn't be a second source production, any more than North American's Colson plant is considered a second source producer. Yet we have many of the same people, and a high degree of success," McCulloch said.

"The Navy spent \$12 million to get this plant to shape as a Navy facility and I don't see how they can let that money go down the drain."

• **Strategic Location:** The Temco chief executive said his plant lies a strategic inland location, away from coastal exposure.

"It is difficult to understand how the coastal area plants have so many failures in contracts, while this inland manufacturing area has so little. Commerce is dropped down in the B-36, Chance Vought doesn't have very large contracts on the Gulf and now we are facing a threat of losing our biggest contract."

• **Comparison:** Temco's McCulloch says a very definite trend in the services is subcontracting a complete, complete production units through second source producers. Air manufacturers he feels will do a better cost job when he is up against the third competitive management of another producer who is making the same airplane.

For this reason, McCulloch believes termination ought to be a more gradual process, perhaps cutting more but depending on the government's "big gun dollar" worth for the dollars it spends.

If the cuts were planned in the way instead of as a direct loss and fast chop-

off, the government would recover something of value for its investment money, instead of "pouring it down the drain."

"This is the case of Temco and the F3H contract, McCulloch said. Temco could finish its tooling and build the first 35 airplanes by late next year but it would not be to terminate the contract. With a cutoff now, the government must recover nothing for its money but some acceptable tooling and raw materials.

If the general termination policy were to be followed, the government would lose.

• **Cost comparison:** for the first 25 airplanes.

- Twenty-five jet fighters.
- Complete set of production tooling.
- A plant with tooling, tooling to manufacture with needed.
- Least Low-McCulloch objects to a service policy of taking program cuts "just as they are going, without understanding to interrupt them so they can be shifted to the government and the least loss in aircraft production and potential production.

"If you only about a year ago that more Navy people asked us not to take more Air Force business in the Dallas plant as we had to building the F3H program," he said. "But we went ahead on the B-47 new facilities anyway. And the Air Force is getting its money's worth. And we are giving the Air Force cheaper overhead prices on their C-54 down at our Greenville base than they ever thought of giving."

"You know Secretary Wilson made a statement that he wanted to protect the low cost of the Air Force cutbacks. Well, if the only reason he was to wipe some of them out of government business."

• **Future Plans:** McCulloch, who joined the Temco plant in 1945, has been very vocal of some \$55 million, plans to keep on going as an aircraft business with some new projects, no matter what.

He wants to modify Temco's training, the Redstone, with a new line training now underway its engine class on the structure and make it the strongest possible low cost competitor for primary contractors.

McCulloch plans to build at least one of the following projects:

- **Turboprop:** Mamba powered trainers, following the Temco Mach 30 design entered in the second Air Force turbine competition with the General Aircraft Co. McCulloch believes his design is most suitable for a transition from primary training to jets and that the Mamba turboprop engine is better suited for training than the F-4 Mustang.
- **Engine:** The Temco engine is specified.

• **A similar trainer:** proposed by the proposed Allison S10 C (turboprop engine).

then cannot put adequately respond to later aircraft orders," the report states.

- **Reduce annual deliveries:** for the next three years. The statement quotes a reduction of 75% in aircraft delivery for fiscal 1954 and 10% for the two following years. "It is impossible to measure the full impact of these reductions because the Air Force has been given no specific indication on new obligations authority or estimated expenditures for the fiscal year 1955 or 1956," the report says.
- **Impose a personnel limitation:** that would make it impossible for USAF

to reach a 120,000-man strength by 1955.

The AF report says the Wilson budget would result in a strength of 119,000 by June 30, 1955, instead of the 133,000 originally programmed and only for 115 wings by the end of 1955 amount of 141. It also says the Wilson 120 wing goal would not be attained until the end of 1956—a year later than Wilson intended.

• **House Program:** Republican Chairman of the Senate Appropriations Committee, indicates he will call on USAF officers to testify on the

Wilson budget is an effort to determine the accuracy of the various statements as to its effect on the USAF program. Before, USAF Chief of Staff Gen. Hoyt S. Vandenberg and USAF Secretary Harold Talbot will testify today (June 1) in open hearings.

Apparently alarmed by the appearance of some Republicans raising the defense budget cuts by Democratic Sen. Stuart Symington of Missouri and Senator Johnson of Texas, Ferguson has indicated he will rely on the personal military prestige of the President to push the budget through Congress.

More CAA Changes Coming, Murray Says

Recent Commerce Department action concerning 15 CAA airport control towers, 40 weather stations, 13 safety inspection offices, four CAA regional administrations, all listed as for new report construction, and letting the post-Baker Airport program near Washington is only the beginning, according to Commerce Undersecretary Robert Murray.

"You will begin to hear about changes in that list (CAA) again," he said in the coming few months," he told the Aero Club of Washington last week. Murray and CAA administrator Fred B. Lee are "re-examining" all the functions of the federal government in aviation business.

Other highlights of Murray's talk:

- **Industry cooperation.** He disagrees with only two of 10 major CAA policy changes recommended in law by the Air Transport Act. One of those programs he agrees with is the consolidation of CAA regional administrations, which he said devoted upon independently of the industry. CAA already has this plan into action.
- **CAA advisory service.** He plans to turn over to the Airport Operations Council the CAA's advisory services to small airports. He said AOC "is going to render airport service better than we can."
- **Federal aid.** Murray says Commerce "will aid a lot of all federal and for new report construction" until we can see where we are going, and wherever we go we're not going to call federal aid. Commerce's mission is to "promote" aviation development, "but you have to look a few eyes to make it successful."
- **CAA education service.** CAA will control its educational service. Industry

people in the field can do a better job in some instances, according to Murray.

- **Republican Policy.** The new Administration's policies with regard to civil aviation are outlined by Murray.
- **Maximum government participation in transportation business.**
- **Goal of government "involvement" of business.**
- **Minimum private ownership in transportation business.**

• **Rejection of federal-state economic relationships and responsibilities.**

On the last score, he said he has been trying to get the Commerce staff to get out in the field and see just how much the transportation can do for themselves without federal meddling. He adds that it is amazing what municipalities can do under the spur of their competition with real rivals.

Vought Fighter Wins Navy Competition

Chance Vought Aircraft Corp. has won the fighter competition with a reasonable success using design given, powered by Pratt & Whitney J57 turbo after burner.

First flight of the new fighter production model is expected in the fall of 1956, provided Navy orders the design soon.

Chance Vought won the fighter competition over seven other aircraft manufacturers including Convair, North American, Douglas, Northrop and McDonnell.

Attack Type—Concerned during the last quarter of 1952, the design of the first such design, aircraft of Chance Vought won 1946 while the F7U-3 Cutlass came off the drawing boards.

When Navy orders the new fighter into production, Vought will be constructing a line of carrier attack type air-

craft like the F7U-3 Cutlass currently in production. That sweeping, tailless fighter, which first flew Dec. 10, 1951, is a large reason of the original F7U-3 Cutlass.

Regulus Program—Employment at Chance Vought, a division of United Aircraft Corp. has grown this year to 11,600, with 80% involved in F7U-3 production at the Dallas plant. Regulus are working on newer versions, testing projects and CV's guided missile, the Regulus.

Regulus in 1947, the Regulus program still is being developed. At the same time, the missile is being produced by hand-carrying carriers in the Chinese (secret) plant. Regulus is designed for launching from submarines, surface ships and shore bases. It was launched first in 1948 and its existence was announced for the first time this spring (Aviation Week Apr. 6, p. 15).

ASU-1 Outpost—Production is scheduled to begin in September 1956 on Vought's ASU-1 Cutlass when output of the F7U-3, which is expected, will be slowing to a close. The ASU does not differ either in configuration or size but will be modified from the F7U-3 by strengthening external stress structure, enabling the fighter to carry a greater bomb load—exceeding its current limit. The fuel system also will be reorganized.

ASU-1 will be powered with three Westinghouse J46-11 jet turbo-propellers, which are ready at the F7U-3. Earlier versions of the F7U-3 were powered with Allison J35s.

Italy Delivers Radar Sets

Rome—The Italian air force has taken delivery of four radar testing sets from the Merelloville factory at Casale near Naples. The United States reportedly furnished the necessary tools.



FIRST WINDOWLESS DC-6A DELIVERED TO AA

Here is the first Douglas DC-6A design plane featuring a windowless cabin. First of these new fighters ordered by American Airlines, the transport has gone into service between Chicago and New York, making

for four-day weekly. The second and third DC-6As are scheduled to be delivered to the carrier in July when AA will begin coast-to-coast cargo service between New York and Los Angeles via De-

troit and Chicago four times weekly. These DC-6As have 9,800 sq. ft. of unobstructed cargo space and can carry 28,500 lbs. of freight. Engines are four Pratt & Whitney CB-17s of 1,500 takeoff horsepower each.

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COLLINS 51V-2 Glide Slope Receiver

Developed especially for commercial aviation and communication aircraft, the 51V-2 is a military development. The 51V-2 is designed as ARINC Specification 5119 as revised during April, 1951 — it incorporates the most desirable characteristics of a Glide Slope Receiver according to leading airlines. The 51V-2 receiver's AGC is extremely fast, being less than 1.0 db from 200 to 14,000 microvolts and 1.0 db from 200 to 100,000 microvolts. This receiver, together with 11 db audio feedback and voltage regulated AGC delay bias, permits tracking of the flag over 100 to lowest landing which gives better alarm indications. A most outstanding feature of the 51V-2 receiver is its ability of continuous characteristics with reduced tube maintenance and changes in low voltage. ARINC often use steel throughout the receiver. Conducted and induced interference has been reduced. Reliability characteristics are unusually good, average response are approximately 70 db down. The 51V-2 is electrically and mechanically interchangeable with an Emerson, the Collins 51V-1. Both AC and DC power supplies are interchangeable on the two models.

COLLINS 51X-1 Marker Beacon Receiver

Another performance-oriented receiver and designed to meet the Collins line. The 51X-1 Marker Beacon Receiver, built using 75 MC, uses either AC or DC power, the same power supply used in 51V Glide Slope Receivers. Basic plus assurance for use in Collins 51X-1 receiver type shockmount. Receiver frequency response is 75 db down from desired frequency, less than 10 microvolts 51X-1 receiver. Receiver search characteristics curve minimizes multiple indications. A simple search 51X-1 receiver is used. In construction is similar to that of the 51V receiver. The 51X-1 receiver is used throughout. The 51X-1 is designed to meet both ARINC Specification 5119 and 5120.

Collins-designed 3 light indicator has standard 51V-2 switch and push-to-test indicator lamp. The light and switch are also suitable in 51X-1 form if it is desired to mount the marker indicator lights on the standard push-to-test switch, because of difficulty that the standard rectangular mounting pattern.



51X-1 Marker Beacon Receiver



51V-2 Glide Slope Receiver



Collins 5 Light Indicator

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NEW C-46 NACELLE, shown with three-bladed propeller, assembly facility



CERTIFICATION TESTS show the nacelle gives better engine cooling

Modified C-46 Passes First Test

Modified C-46 has cleared the first Civil Aeronautics Administration test conditions hurdle with successful flight tests of the transport's new engine nacelle. Glider load and air cooling exceeded CAA safety requirements.

Next step in the C-46 modernization program by American Airlines, Miami, Fla., is installation of the new proposed C-46 version of the Pratt & Whitney R-1660 engine (Aviation Week Feb. 25, p. 15). The new powerplant will increase the transport's total take-off power to 180 hp. The new nacelle is designed to take the C-46 engine.

Additional changes—ventilator plenum, the following additional modifications to bring the two-engine aircraft up to modern transport category certification weight, estimated at 49,000 lb.

- Automatic pump fueling.
- Hybrid brake-pusher system, improving braking efficiency.
- Control surface armament to overcome

problem of controlling increased torque on a single-engine climb.

Proposed gross weight now 49,000 lb. compares with a temporary Civil Aeronautics Board permit allowing C-46 passenger operation at 48,500 lb. and a theoretical CAB cut no less than 46,000 lb. at the end of the year.

Nacelle Test-Flight tests for CAA certification showed maximum cylinder temperature at 213°C indicated, 150 controlled on an exposure check. Maximum oil temperature of 170°C indicated compared with 100°C permitted by Pratt & Whitney and Air Force and 93°C by CAA. Armstrong's propeller calls for a new oil cooler than the one used in the test phase, further reducing oil temperature.

The new nacelle has a standard steel forward end complete for most doors and protrusion outlets. But American World Airways officials, American and Lanes "study are

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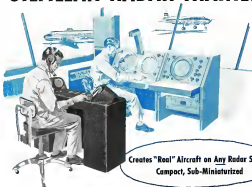
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negotiating with American to make the small change on this C-46. They also are contemplating the next step with American—conversion to C-119 engine. American (Columbus) was the primary designer for the C-46 (Costs \$200) for passengers.

Just Before—American is working with representatives of United Aircraft, CAA, CAA, C-46 Engineering Foundation (C-46) organization that effort is in proving the plane's unique and perfect need and individual criteria. Air Force also has a technical observer studying the program.

An alternative plan of some C-46 operators is to install a small internal jet engine for emergency power. This would be cheaper than the American Aviation project, but performance could not be the same.

Before—Regulating—Microfilm, operators of C-46s that have the Hamilton Standard altimeter problem have won CAB permission to increase gross weight from 14,300 to 15,000 lb. by dropping blade diameter from 8 to 9 in., a modification that would greatly increase efficiency. But the special regulation expires Dec. 31, deadline set by CAB for modification.

American Aviation says it cannot complete the C-46 modification for money by that time, but possible on a 10 to 15% scale.

CAA Adopts New Runway Markings

New Civil Aeronautics Administration tests suggest runway marking standards range from elaborate improvements for busy airports with all-weather runways and high-density traffic to minimum requirements for small fields with VFR.

The new system has been tested in actual use at New York's La Guardia and Newark Airports. It has the approval of Air Line Pilot Assn., Air Transport Assn. and Airport Advisory Council of CAA. International Civil Aviation Organization is expected to complete adoption of similar standards shortly so that the runway marking system will be uniform at major air bases throughout the world.

The system includes three types:

- All-weather.
- Basic instrument runway with navigation aids.
- Visual flight rules runways.

Details of the extensive markings, runway designations, threshold markers, landing zone markers, side steps if present, and taxiway and holding-line markers are in the new technical manual and order 7000, issued by CAA.

Airports requiring deviations from the new standards are expected to notify the CAA standardization coordinator, Washington 25, D. C.

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New Spanish Transport Is Tested



C-122 Alouette II, recently started on a flight test program, is the second twin-engine transport designed and built by Construcciones Aeronauticas S.A., Madrid. It carries 16 passengers, one of them, 3,200 lb. 9 in., length 51 ft. 10 in., and height is 13 ft. 11 in. Empty weight is 13,150 lb., gross weight is 16,800 lb.



NOSE CLOSEUP of Alouette provides a good look at working of standard Turbomeca 780-hp Hubble HC-19-780 engines. Note small dual rear wheels. C-122 has a design top speed of 214 mph at 9,115 ft. and a cruising speed of 166 mph.



ALOUETTE COCKPIT is simply furnished compared with U. S. standards. Instruments include eight flying equipment. Cabin is air conditioned but is not pressurized.

Senate Asks Paring Of Windtunnel Costs

Senate Appropriations Committee has urged General Accounting Office to investigate specific costs at wind tunnels by various government agencies.

Senators want GAO to recommend a plan for "controlled use of such large facilities to the end that economy may be effected in the use of power as well as personnel."

The committee made the provision in reporting out National Advisory Committee for Aeronautics fiscal 1954 appropriation, which it cut to \$62.4 million. It means budget called for \$77.5 million. The House allowed \$64.6 million.

NACA general director Dr. Hugh Dryden testified he was "completely well pleased" with the budget as approved by the House. "We were grateful substantially the full amount of the annual budget, the reviews being based on a policy of deferring certain items of construction."

Turboprop Airliners First, Says Hibbard

Passenger aircraft costs lower than present but first are possible using new turboprop engines, says Lockheed's vice president-engineering Hal Hibbard.

The transport plane designer announced the propeller turbine configuration to the industry May 15 at a recent meeting of the Society of Automotive Engineers in San Francisco. In so doing, he gave added weight to recent similar support for the turboprop expressed by Eastern Air Lines' president E. W. Ryan, and American Airlines' president C. R. Smith (see American Wings May 18, p. 26 and May 18, p. 100, supra text).

■ Most of Sound-Turboprop aircraft are now being built, Hibbard reported, especially referring to the Navy KTV-2 Super Corsair which is to be fitted with P&W T40 engines. But commercial transport aircraft still are five years away, he stated.

The new planes must have a small difference—costs here, and the Lockheed executive explained. "A technical goal yet transport would be independently designed if it should not preclude any possibility."

Hibbard saw turboprop engines as making the Constellation "new" life "well through the 1960s."

He also referred briefly to the ducted fan type of jet powerplant, now under active study, as ideal for a revolutionary brushless phase capable of attaining 500 mph in level flight. "Such a plane," he said, "could be common in 1970 to 1975, even comparable to the Constellation."



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SIKORSKY HUP-2 (left) and HUP-1 (right) maintenance can be taught more simply with new trainer built by Perdon Rodgers.

Trainers Ease HUP Copter Servicing

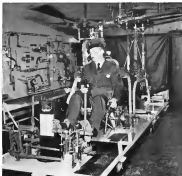
- Mobile units will train Navy teams on-the-spot.
- Other service rotorcraft to get similar setups.

By David A. Anderson

Motion, Ps—The first mobile units to train teams for helicopter, designed and constructed for Perdon Rodgers Corp. by Bureau Rodgers, Inc., is now helping to train Navy ground crews who service Sikorsky HUP-1 and HUP-2.

Details of this new training device were explained to AVIATION WEEK by E. A. Katz, of Perdon's service department, which spearheaded the design, and by executives of the Naval Air Mobile Training Detachment during their introduction course with the unit.

In its present form, the trainer consists of a series of mounted panels, as well as panels using the actual components of the helicopter. Maps out of the trainer is a detailed customer transmission system, complete from pilot control column to rotor blades. **►Baker-Miles**The idea of the trainer originated with the Bureau of Aeronautics' Maintenance Division, which



TRAINER 5 is composite transmission, control and rotor system of HUP-2 copters.

Panels From Mobile Helicopter Maintenance Unit



Trainer 1A: Lateral and directional controls.



Trainer 1B: Longitudinal controls.



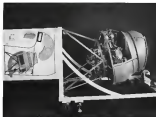
Trainer 1C: Collective pitch, throttle controls.



Trainer 2: Hydraulic systems.



Trainer 3: Electrical system.



Trainer 4: Engine cooling system.

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tion, setup, for the so-called composite transmission, control and valve systems. This transfer could merely assemble the physical heliograph; it compares a pilot's seat with full controls, two rotor heads with complete hubs and stub blades, and the necessary transmission shaft and cables connecting all these, over panels.

Power for this straggled down "link system" is a 1 hp. variable speed & electric motor coupled by belt to the clutch drive shaft. Speed of the motor is regulated by the collective pitch and throttle mechanism to simulate the engine action.

All the flight controls of the heliograph are easily simulated in Trainer 3. This feature permits complete check-out of the entire control system by maintenance crews; they can follow a control cable, for example, from the pilot's seat over the various sectors, wires, control pulleys, onto connections with chain link drives or to the control area shaft.

This trainer also incorporates the blade-deforming feature of the full-scale heliograph. For disassembled stages, heliograph rotor blades are folded. But before this can be done, the blades must be deformed, that is, the rotor must be moved independently of the other, so that all blades when folded line up over the fuselage. This means that the usual angle position of the



DRAFTING INSTRUMENT

Variable size drafting instrument combines features of a rule, protractor and compass for precise use as a single instrument. The semi-circular end is marked in degrees, and the longer is either in English or metric linear scale. All corners and intersections are curved to radius often such by definition for level surfaces, flats and such. The holes in the instrument correspond to standard drill sizes, either letter, number or fractional sizes. Corners can be drawn by using the semi of round holes along the edge of the rule. The instrument was designed by Gustav Langer, Lithuanian at Radio Aircraft Corp., Chesham, Calif. Representatives for its manufacture and distribution are currently under way.

blade must be changed. The system which does this operation is known as a de-blade.

Servicing of this transmission trainer is very complete. Both forward and rear rotor transmission units and the clutch are sectionalized, as is a single slip clasper on the forward rotor and a slip clasper on the rear rotor.

Some alterations have been taken with the actual geometry of the HUP heliograph in order to make the parts adaptable to the trainer. The drive shaft has been shortened, and the rear rotor shaft has also been reduced in length.

Overall height of the unit has been reduced by mounting the rotor as low as possible without lifting the pilot's head. The only drawback is that head clearance is not provided for maintenance personnel who might be working in the vicinity.

• **Twigg's**, the last unit, is a small panel which mounts all the special tools required by an entire squadron for maintenance of its actual complement of HUP heliograph.

It is a tribute to the engineering and design of these heliographs that only about 10 of the special tools are required for complete maintenance operations on the HUP. In this group of 40 are included such items as the main platform, jack pads, and blade folding equipment—which are not exactly special tools. Such items as manual wrenches or pin pullers are kept to a minimum.

• **Mobile Unit—Two** HUP trainers have been built and will be used by the Naval Air Mobile Training Detachment in mobile units to visit the different Naval air installations operating F-4s heliograph. One NAMTD unit will visit East Coast bases and the second trainer will be assigned to the West Coast.

The course at each station will last five weeks, with approximately 100 classroom hours of training. About 30 hours of that time will be spent on electrical systems, including about 15 hours on instruments.

With this collection of mounted panels and demonstration go cabinets containing 166 large charts that diagram such things as electrical system, lubrication and hydraulic systems and exploded views of components.

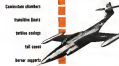
Barney Rodger designed and constructed this trainer under the direction of Patrick's service department. Cost of the trainer was about one-third that of a standard production heliograph.

Patrick's representatives point out that in addition to the direct saving and fast cure, there is a continuing saving by using a trainer rather than using up a heliograph for unrestrained purposes. • **USAF** Trainer-A, another mobile trainer for use by the USAF Mobile Training Group from Charlotte

*Looking beyond
Today's horizons*



means precision and skill in the fabrication
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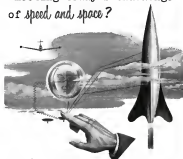


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MB is now being built by Bristol-Rolap for the B-21A (Lockheed). This also will consist of an intake trimmer unit.

The first unit will simulate the forward rotor head and the flight control, the second will duplicate the fuel temperature drive, the third will show the engine and engine cooling, the fourth duplicate the hydraulic system, the fifth, the electrical and instrument system, and the sixth, heating and ventilation.

A collection of 34 charts will accompany these B-21 trainer units.



ONLY SELECTED PARTS are four component blades, two roller bearings, two oil seals, two flexible fuel lines and two component shaft types bolts . . .

Rolls-Royce Avons Show 600-Hr. Life

An overall life of 600 hours for the Rolls-Royce Avon turbojet has been demonstrated by the Royal Air Force in a 36-day sequence of flights by three English Electric Canberra.

After 600 hours, engine thrust was still within 7% of the standard figure and specific fuel consumption showed the low increase of 4.11%.

Rolls says that the test "is a major achievement for an outgroup of any type and sets a new standard of low-cost maintenance . . ."

Purpose of the test was to determine the overall life of the engine, stress and to provide a datum for R&D requirements of personnel and facilities for maintenance and overhaul.

The three Canberras were based at three different stations. Two of the six engines were strapped at 400 hp and a third at 450 hp. The striped condition of these powerplants indicated that it would be possible to fly the remaining three engines right up to the 600-hr. mark.

After that time had been accumulated, the three engines were stripped. Rejected parts were four compressor blades, two roller bearings and two oil seals from the auxiliary drive, two flexible fuel lines and two compressor shaft types bolts.

The burner cans were only slightly affected, says Rolls, and all have been accepted for a further service life of 400



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Refer to KX-1 Section in K. Bulletin



MINI-MATURE receptacles of the new Cannon "U" Series are used on connecting switches, relays, transmitters, amplifiers, and other sealed components, requiring a true hermetic seal at a connector of sub miniature size with performance superiority.

"U" plugs have a metal shell and "SIL-CAN" insulator, cable relief and aluminum nutless design.

Bayonet-type locking means prevents vibration failure. Rated 1700V d.c., 3A. Available in 3, 6, and 12 contact arrangements with one plug style and two receptacles.

Consult Cannon's special pleasure outlet manual

Refer to U-10 Bulletin



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hours, retaining a 1,000 hour total. Teststand time for the plugs dropped considerably as the test program developed. During the first month, about one and one-half hours was a typical figure, but by the third month of the tests, the time had dropped to 35 minutes.

Peak utilization of the aircraft was 77 flight hours out of 84 total elapsed hours.

For some of the flights, reentry was either avoided or delayed because of weather, and this resulted not only in increased maintenance costs on airframe and engine. At the 670 to meet these was no sign of corrosion by salt.

Both points set that during the test period, each engine covered a distance of about 900,000 miles before overhaul. This compares to a figure of 100,000 miles for locomotives or commercial road vehicles in England, says Kelly.

ASME Sets up Lube Study Group

A Lubrication Activity group has been set up in the American Society of Mechanical Engineers to function as a subcommittee reporting to the society's Professional Division Committee.

Instituted in an experimental undertaking, the Lubrication Activity will conduct these study groupings and efforts.

• Research. Theories of lubrication, mechanical treatments of design, boundary and field film investigations, etc.

• Lubrication. Physical properties and action of lubricants.

• Builders. Factors such as material design, seals, coatings, methods of starting new machinery, and maintenance related to construction.

• Operation. Maintenance practices, overhaul and repair, lubrication personnel.

• Coordination. Lines for coordinating the new activity with professional divisions and other engineering societies, arrangements for co-sponsorship of papers on lubrication.

• Applications. Methods and equipment considerations. This group is set up to advise, but is being organized.

• Progress. Underway—A number of projects already are underway. These include analysis of effect of materials on lubricants, effect of lubricants on seals, study of proper lubrication for treatment of metal surfaces subjected to oil, coordination of lube design data, testing corrosion, etc.

Editorial should be set up with the American Society for Thermal Machinery and American Society of Lubrication Engineers. The Lubrication Ac-

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study has surpassed about 150 men interested in becoming active members. Inquiries are invited from any ASME member who wants to join in the work, designing the one or two groups in which he is interested. Address is 29 W. 39th St., New York.

MIT Schedules Light Metal Talks

A special program designed to attract public and possible information on light metal casting is being sponsored by Massachusetts Institute of Technology, during the coming summer

session of the school. It will run from Aug. 31 to Sept. 4.

The program will include consideration of the principal light metal castings, magnesium and titanium—with one day being given to aluminum.

Because an important objective of the program will be to encourage free discussion of the problems, no subjects will be prepared either before or after the conference. Topics will include grain and melting, fluid flow, shrinkage and mechanisms of solidification, heat transfer, grain or light metal, influence of cast microstructure on mechanical properties, casting design, grain size control, inspection and repair.

Additional data on the program and application blanks may be obtained from Director of the Summer Session, Room 3-071, Massachusetts Institute of Technology, Cambridge 39, Mass.



Air Bearing Smooths Drill Jig Positioning

Compressed air is being put to work at Seltzer Aircraft Co., to do the job of a thrust bearing in a heavy machine tool, easing the effort required of the operator. This is particularly helpful where female production workers are employed.

Seltzer's "air float bearing" is used on the index table for a drill jig on a Nitro multiple spindle unit. The air manifold is connected to a remotely operated control valve. Manifold lines located radially around the machine's feed base plate lead the air into the space between the feed plate and the heavy rotating plate above it.

Advantages—Seltzer reports that the cost of providing an air bearing is much less than for a conventional thrust bearing, especially where gaps are large and heavy. And because the friction coefficient is lower, the rotating plate can be turned easily. Since the plates are slightly separated during movement, wear is reduced.

Air lift—Air at 50 psi is fed to the manifold by opening the control valve, raising the rotating plate about .005 in. The rotating plate is opened to the next index point and the air valve is closed. The air in the system escapes and the rotating plate settles on the base plate to give a rigid support for the next drilling operation.

In tools of this type, the plates are usually machined and have milled grooves through which the air can travel. This gives an effective lifting area equal to that of the base plate's face. Because the air escaping it at about 45 psi, the difference between this and the rotating pressure gives an effective pressure of 45 psi on the area between the plates.

The contact area between the plates must be protected against chips. This can be done by providing lead rollers to and the front plate the plates.

RAF Getting New Navigation Trainers



MARATHON T2 is navigation trainer being delivered to Royal Air Force by Douglas Corp., Ltd. The plane is powered by four 140-hp. de Havilland Gipsy Major and has a 1,450-wk. range. RAF is getting 50 of the T2s.



MODEL of the Marathon shows interior arrangements. Passengers, from front to back, are radio operator (seated forward), instructor, two pupils. The trainers carry Robinson 34s. 4 and four airplane equipment.



INSTRUCTOR layout is in foreground (actual plane pictured here). His seat faces forward, as do the . . . **PUPIL** navigation station. The T2 Marathon is designed for basic and advanced training.

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LETTERS

Howard Challenged

The article by Jim O. Howard on which Alexander McDuffy reported in your May 13 issue has left many flight engineers, including the writer, slightly unsettled. It is of little surprise to us that the President of the Aeronautical Sciences Society of Howard to withdraw the paper before it was presented. The USS is representative of a good cross-section of the current group of men who derive their energies to the aviation industry.

The first assumption of the article was that it was of the type which would appear in the aviation industry. However, some people in this industry feel that the biased, ill-fated efforts of hundreds of thousands of engineers, scientists, pilots, designers, etc., who have produced the world's last and next aircraft could be related in the face of unadmitted chaos. We would like to see in the defense of aviation.

Today we are at a state in the development of the art of aviation which causes most people further to question safety, efficiency and comfort than ever before. No one in a related field or safety could but we are all constantly working to improve it. Mr. Howard's attack for a new order upon which to base his safety is almost humorous.

Certainly, if you could carry all of our

present air travelers in DC-3's over high terrain, at high speeds, over weather, fog, rain, you would have a basis for comparison with any modern aircraft.

However, the facts of life are that the DC-3 will not provide such transportation. We had to develop jets, but we had to do the job of modern air transportation developed by an actual failure and not by a modern aircraft. To accomplish this purpose these jets must have to have the same new design to perform fast, high-altitude flights. That is, the aircraft are necessarily a more complex machine and due to their size there is a lot more of the complex machine. These are facts with which we must deal. We cannot ignore the change but attempt to quote present safety standards against new ideas we have a solid fact for comparison.

Nobody in this industry willingly tolerates criticism charged by Mr. Howard. Also participating in many aviation investigations, nevertheless, regulations continue to evolve down an aviation safety to get at basic causes, we are convinced that the best hope and common sense of the industry are joined in the fight for maximum safety.

Mr. Howard's design made a mockery of the CAA, CAB, NACA and the Army or government, also involving every pilot in existence. These theories are not at question. My liver never doubted his. Howard's inability to approach the aviation problem, but at least we can only hope that with a slightly more realistic approach.

Many people misinterpreted Mr. Howard's statement concerning the safety level of an aircraft which compares the safety level of a flight engineer at different times.

The data on that our modern jets in which do require such assistance in their management. With this fact well established, Mr. Howard is doing the industry a disservice by telling us that there is no cost to this level of safety with a crew of two or one. At least we must realize that no one is suggesting the aircraft and not steps to safety, but merely to throw us to the wind a very small of Mr. Howard's dream level of the sea.

Let Mr. Howard go back to his old ideas. The safety of the world as we will go in modern transport, safety and style in the products of the world's finest group of transportation engineers. (The American Aviation Institute).

WILLIAM D. KYLE, President
Flight Engineers International Assn.
73 Third Ave. Suite 200
New York, N. Y.

Those F6F Drones

This letter is provided by the comments on the dream used in Rome, contained in the article "Military Progress: The F6F Drone," by David A. Anderson, in your May 13 issue.

While not promising to be capable of competing on the occasion of the military progress and causing for purposes of the letter that your portrayal in Aviation Week on May 13 is reasonably accurate, I will be put in a place for that level of progress and available "safety" dream.

There is a hard to be a "top of the" among similar products when the "top"



side" dream, which has been a most effective proposition with little development is used successfully in a field devoted to safety and expense.

If a simple disconnection to know the something you should have seen in use for something you are saying. This is especially so when you have involved an automatic safety and find that the something you have been perfectly making. I think, therefore, that the extremely adverse criticism of the use of the F6F drones in Korea has been unwarranted. Many criticisms we must have, and if there are difficulties we must overcome them.

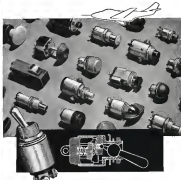
But we did not see the liquidation when the machine was involved, and that made a machine which could be as useful today as some day in the future made was spent. Given, therefore, the fact that it is the situation of the machine according to completely replace the pilot aircraft, there will always be types of safety aircraft that require because the pilot aircraft (the F-4) that down by the Century may be an example).

It may be wise to support those bright lights in the service who see an opportunity of obtaining some use for older aircraft, obtaining thereby a better return for the defense dollar. This is a time when the fact that the program is not in running your decisions valid, the results those contribute one of the low available ground to ground or air to ground combat, if not the only one. However, back to the economy with all machine progress 100% successful, we cannot afford to have any, with a feeling of confidence, machine safety weapons. With all of the time devoted to the search phase, it would not be for that of machine performance in many applications after a little more effort in research and testing.

It is interesting to note that several of the (typed to ground) matter referred to in your article as promising are by your descriptions hardly more than small drones with the pilot's seat removed. It is good that these projects are successful, but why not also use aircraft that are modern but an excellent advantage in pilot control by the fast pace of making pilot aircraft development?

There has been very little development in this field since the war when the early beginning was made. However, the technology is well developed in comparison to modern, and the developments required to make the small drone an adequate pilot could be accomplished for what would be considered "minor costs" to a single project. It took considerable money and operation in our time war-impregnated drone as weapons before the eyes and objectives of the world.

While the men devoted to research to the



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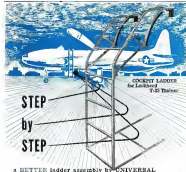
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substitution or other weapons are very ready to point out any shortcomings of the aircraft design when compared with aircraft used in the past. I would like to list a few of the advantages of the older design.

• They provide a use for aircraft that are no longer efficient for present combat. It would seem that they had not as much chance as they would be, and, perhaps, and no reason—no reason—no reason.

• Advantages and disadvantages are relative—all have had the benefit of service life for present operations. What better patterns could there be of modern and present patterns?

• Substitution and problems are not as simple as it is the case of modern aircraft. It would seem that they had not as much chance as they would be, and, perhaps, and no reason—no reason—no reason.

• Performance. It would appear from the viewpoint of the aircraft that the old design is a simplified task as compared with modern aircraft. It would seem that they had not as much chance as they would be, and, perhaps, and no reason—no reason—no reason.

• Minimum transportation problem. In many cases they could be flown to the combat area by human pilots, and it must be that transportation presents no greater problem than that of lighter aircraft.

• Can be flight tested by human pilot prior to use—great advantage over the modern design that does not fly but is tested.

• Limited fuel. The fuel is the same as that for present aircraft. It is available when needed, and its transportation presents no unusual hazard in respect.

• Maintenance. In general, modern aircraft are more complex and require personnel trained in present aircraft are outside of what is known.

• No unusual handling facilities. Modern aircraft are launched from any ship or carrier that is able to fly aircraft.

• Simple maintenance. The modern aircraft is extremely complex. The simple design offers the most performance without the expenditure of human life.

While not subscribing to all my list of simple aircraft and regarding simplicity as their controlling rule in today's problems, I think there should be additional consideration given to simple design.

Robert B. Egan, President
Syst. Engineering & Development, Inc.
Ft. Worth & South Fort Worth, Tex.

Robson's Right
There just don't see to Capt. Robson to let him know he has a friend. I want with everything he wants ("Pilot and Those AF Chaps," Feb. 12). When the hot heads and all ready to get a reasonable perspective of them and not get the picture.

(I think that is reasonable.) Would like to ask you, if they let their words and thinking into military transportation I, myself, would not.

What I had time to write a letter to Robson's name but his conflict he can take care of himself.
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*MICRO "W" switch assembly installed on Chance Vought's Navy Cutlass to signal pilot when the landing gear is extended and locked in position.

*MICRO "LA" switch assembly installed on the main gear and extension of Chance Vought's Navy Cutlass which locks the landing gear to provide against accidental retraction when the ship is on the ground or carrier deck.



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PRODUCTION



OUTER WING PANEL of AT-6C shows smooth, high gloss finish of glass-plastic material. Root and corner metal patch angle for panel attachment to wings' metal center section. Metal screws and plastic wingtip are still to be fitted on panel doors.

UPPER HALF SANDWICH of right panel now from inside shows the ribs, internal members, and gusset joining dots to receive various beam members.

First Detailed Report on . . .

How Glass-Plastic Wing Is Fabricated

By Irving Stone

The underway to produce mirrored plastics for big jobs in tomorrow's high-speed aircraft is well under way. Plans and projects in the works will pave the way for a wide use of these plastics in planes, missiles and auxiliary components.

The studies aim to take advantage of such properties of this type of material as their favorable strength/weight ratio, low coefficient of expansion, good flexibility characteristics and aerodynamic smoothness.

In this article, fabrication details for aircraft structures of plastics are given for the first time.

► **Proving Efficacy**—One of the earliest applications of high-strength plastics—a role that practically launched the material into the field of primary structures in a glass-plastic outer wing panel which has been under high evaluation for several months at Wright Air Development Center, Dayton, Ohio.

This wing has been flying as a North American AT-6C (first details of the project were published in *Aeronautics* (Mar. 2) 3) in a development still far from perfection as far as superior aircraft are concerned. But it is a concrete beginning.

Prime purpose of the development was to establish factors of design for low-pressure, nonbonded-plastic, laminated or aircraft structures. A wing represents a highly stressed major structure, so it was felt the outer wing panel on the AT-6C would be a proving article for determining the suitability of plastic materials for a complete plane.

Another goal was simplified design incorporating sandwich construction. In the final configuration of the glass-plastic wing, there are relatively few structural parts in comparison with the numerous ribs and pieces of the conventional metal panel.

► **Known-How Advances**—The wing was an experimental project. Through its final weight was somewhat above that of the metal counterpart, its strength/weight ratio was slightly greater.

Because it was a "ground floor" effort, the project required a considerable period from conception of design to delivery of the flight article. In the meantime, the act of designing for and working with mirrored plastics has progressed considerably. If the new AT-6C wing project were to be initiated today, a lighter, more efficient structure undoubtedly would result through various refinements in techniques and materials now available.

► **Work at Wright**—The AT-6C glass-plastic wing design was begun early in 1944 at the Engineering Division of the Air Materiel Command's Aircraft Laboratories. This activity now is under the AMDC's Wright Air Development Center.

Three experimental articles were built in the Engineering Shop Laboratory in 1945-46. Static tests of the third panel were concluded during 1946.

► **Flight Article**—In July 1947, East Coast Aircraft, Inc., Paterson, N. Y., now a subsidiary of Raychem Corp., was awarded a contract to build eight and left-hand wing panels for service test, plus an additional panel for further static proving.

Under this contract, RCA was to construct the wing panels in accord with AMDC's engineering drawings first as the project progressed, RCA suggested design changes which led to the configuration now flying.

The static test article was delivered to the AMDC's Laboratory in November 1948. This right hand outer panel went to about 140% of ultimate design load in the current condition (without high angle of attack).

The flight panels were delivered in February 1951. They were later installed and flown on the AT-6C at

Details of Glass-Plastic Wing Manufacture



INTERNAL STRUCTURE of this sandwich is shown in place. Parts are (A) leading gear strut fitting, (B) plywood beam, (C) main beam, (D) aluminum gusset fitting, (E) intermediate beam, (F) flap beam, (G) aileron beam, (H) tip rib.



LAYUP for East Coast Aircraft-built AT-6C main beam core shows (A) glass-fiber laminate on beam face, (B) specially wrapped cellular exterior outside spar area beam, (C) specially wrapped cellular exterior inside spar area beam, which are inserted to intercept the spar area webs.



ASSEMBLY shows the holding panels' upper and lower skin sandwich and internal structure in place during one test. Temporary closure panel for leading edge outer nose part will be applied in market using operation.



PANEL ROOT END shows pattern of honeycomb portion (A) at root end, which, where applicable will be bolted for emergency panel in wing center section. Gusset (B) provides slot for leading beam.



BOTTOM SURFACE of stress openings (which will be fitted with metal screws) and key slot cleaved in place (right).



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► **Blanketing**—The original AT GC panel was a conventional skin stronger type. The new plastic structure assembly is a sandwich type shell enclosing a low density, core material faced with thin, high-strength inner and outer skins of fibrous glass-reinforced laminates.

Months, Owens-Corning Fiberglas cloth is reported to have been used for the skin laminates.

A few internal members give the sandwich shell most up the completed plastic wing panel.

First, the fabrication technique ECA employed to construct the glass-plastic panel.

First a mold was constructed for the skin shell. This was made of mild stainless steel machined with thin wire laminates on the outside. The laminates were attached to a steel dolly to permit rolling the mold into the curing oven. Joints between the aluminum frames and the steel dolly allowed for differential expansion of the metals so there would be no distortion of the mold.

Bar supports were installed on the mold to duplicate the wing panel boundaries. Assembly fixtures located the rib sections and produced the wing beams. Other fixtures, embedded within the support locations for the skins on each quadrant and the leading edge re-tracting angle.

The mold release was reported to give separate forms for the upper and lower halves of both right and left hand wing panels.

Separate metal molds were constructed for the basic airframe—main structure, fairings and integral support beams—and for the panel skin reinforcement in the tip area. Reinforced plastic molds were made for the wing tips. For the skins, sheets of glass cloth were used.

► **Skin Sandwiching**—The wing integral skin, glass fabric cloth was impregnated with polyester resin and the cloth then cut to pattern. Lay up in the mold was such that fiberglass thickness varied from 0.15 in. at the wing root end to 0.21 in. at the tip.

Cellulose cellulose acetate (CCA) core bars for the sandwich were specially wrapped with non-integrated glass cloth, then placed in the mold over the inner surface of the outer skin laminates.

The CCA core bars were cured from 8:15 in. thick at the root to 0.5 in. at the tip. Core bar width was about 1 in. The outer skin laminates were placed over the core bars to complete the basic sandwich structure.

During this stage of the layup process, structural members made for support and door openings in the panel's upper and lower surfaces.

Next, CCA rib frames were installed



HALVES of panel are joined at leading edge with laminated extension.



PLASTIC outer panel is connected to wing center section by metal angle.

wrapped with non-integrated glass cloth were installed at their respective stations. There are four of these frames, the surfaces cast constituting the top/bottom skins.

► **Grouts for Beams-Skins** (chords) for receiving the beam members were provided by closing, wrapped, straps by CCA panel strips in the inner skin on each side of the beam locations.

Proper width for the slot formed between grouts was insured by the skin primary members of aluminum strips (used in place with the half-panel, then removed after curing).

A vinyl blanket was placed over the half panel assembly, an angle used and the perimeter with wire chrome plate. After the mold dolly was wheeled into the oven, the dolly was a vacuum plate was connected to the blanket. Thermal complex were maintained on the mold at various places. Over temperature was brought up to about 250F over a period of about three hours, then held at that temperature for about two hours. Pressure under the blanket was maintained at approximately 10 psi.

After the curing, the blanket was stripped, outer skins removed and edges torn down as the cleanup process.

► **Beam Make-up**—Meanwhile, the beam members were being prepared in the same general manner as the skin sandwich, except that the specially wrapped composite CCA core bars were integrated at intervals with non-integrated glass cloth.

After the panel sections had been

wrapped around each bar. Thickness of the beam was maintained constant from root to tip. Laminations on the beam faces varied from 10 ply at the root to five ply at the tip.

The skins, shear, tip and wing tip were made up similarly of glass cloth laminates.

Curing these components was similar to the procedure used in curing the skin panels.

► **Panel Assembly**—For matching the internal members to the upper and lower skin sandwiches, the upper panel was first placed on a steel assembly fixture. Then the internal structure was fitted in place after all laying (contact) surfaces had been faced with a layer of resin-impregnated glass cloth and an extra coat of resin.

The matching (lower) sandwich skin was placed over the opposite edges of the internal structure after all contact surfaces had been faced with the single layer of glass cloth and extra resin.

In this joining of skin to internal structure, provision was made for leading together the inside skins of the upper and lower sections in the leading edge nose joint. This expediently constructive work in the form of a laminated skin extension from one shell to the other.

► **Assembly Girding**—The final assembly fixture's outside surface was fitted with chordless frames conforming to the shell contour and incorporated reinforcement members along the beam lines.

Clamps on the beams applied pressure to hold proper airtight contact and assure close contact between panel skins and internal structure.

The fixture, over the complete assembly, was wheeled into the oven for postcuring at 250-275F for approximately two hours. After cure, another glass cloth laminate was wrapped over the leading edge of the panel outer skin completely over the nose joint.

This laminate then to a single thickness about six inches at the tip of the nose joint. Curing of this nose laminate was done in the oven under a vacuum blanket.

After this the tip ribs were located and clamped in place and bonded in the oven. The skins around the ribs were cured in a vacuum oven.

► **Root Connection**—A metal cut-angle was used for attachment of the plastic panel to the metal center wing section.

To provide for this connection, the CCA cores at the root end of the sandwich skin initially had been cut off by a distance of about 31 in., with metal inserts substituted for the cut ends.

These metal plugs were carefully wrapped with laminations of non-integrated glass cloth.

After the panel sections had been

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used, the plugs were removed to give a laminated, rectangular honeycomb pattern at the wing root.

Adhesive and Kevlar-7 layers were impregnated cloth was used as an adhesive between the mainplane and the outer skin of the panel area beneath it. Glue was used to hold the angle and skin in close contact. After curing, holes were drilled through the mainplane and outer skin laminates to accommodate attaching bolts.

In this arrangement, both the angle-laminate bond and the mechanical joint contribute to insure strength of the outer panel-to-center section attachment.

Revised plate mate around access openings in the plastic panel provided means for attachment of metal suspension daisy.

High finish—The completed panels were given a finish paint treatment which, in conjunction with the smoothness of the plastic material, give an extremely high-gloss surface to these components.

Wright-Patterson's Aerodynamics Section is said to have performed flight tests with the plastic wing-equipped AT-6C, that showed an appreciable reduction in the maximum drag coefficient as compared with the original metal panel.



LITTLE GIANT

This proves to be one of the little giants in the Air Force today. The program is a 1/10-scale working model of the F-105, now being built by E. W. Kim Co. for operations at Ramo Aluminum and Chemical Corp., Newark, Ohio. Model follows the full-scale machine in every important detail, even its 15 in. long top to bottom to simulate the 70-ft reach of the proposed machine. It

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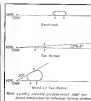
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The plane was on a heading to MacArthur Field, San Francisco. As the chronometer every hour passed over the sound, the DME did tell us we were seven miles from the field. As the land rose into two clouds a minute later, DME told us we were only 4.6 miles from the field. In a matter of seconds we were able to calculate our ground speed—144 mph.

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Test No.	1	2	3	4	5	6*	7
Radius	20 mil.	30 mil.	40 mil.	50 mil.	7 mil.	8 mil.	15 mil.
Degree of Orbit	DME Readings						
10	35.9	16.0	16.8	14.5	7.2	0.8	16.7
20	35.9	16.0	16.8	14.5	6.9	0.8	16.9
30	35.9	16.0	16.8	14.5	7.0	0.8	16.9
40	35.9	16.0	16.8	14.5	7.2	0.8	16.9
50	35.9	16.0	16.8	14.5	7.2	0.8	16.9
60	35.9	16.0	16.8	14.5	7.2	0.8	16.9
70	35.9	16.0	16.8	14.5	7.2	0.8	16.9
80	35.9	16.0	16.8	14.5	7.2	0.8	16.9
90	35.9	16.0	16.8	14.5	7.2	0.8	16.9
100	35.9	16.0	16.8	14.5	7.2	0.8	16.9
110	35.9	16.0	16.8	14.5	7.2	0.8	16.9
120	35.9	16.0	16.8	14.5	7.2	0.8	16.9
130	35.9	16.0	16.8	14.5	7.2	0.8	16.9
140	35.9	16.0	16.8	14.5	7.2	0.8	16.9
150	35.9	16.0	16.8	14.5	7.2	0.8	16.9
160	35.9	16.0	16.8	14.5	7.2	0.8	16.9
170	35.9	16.0	16.8	14.5	7.2	0.8	16.9
180	35.9	16.0	16.8	14.5	7.2	0.8	16.9

* Test No. 6 was conducted while climbing from 5,000 to 10,000 feet alt.

** This reading was taken at 10 day of orbit.

Accuracy of ETAs

Test No.*	Approximate flying time from fix at time estimate completed (seconds)	No. of observations in IAS	Min. IAS used (mph.)	Max. IAS used (mph.)	Difference between ETA used time and fix (seconds)
1	35 mil.	6	118	140	5
2	35	0	140	140	7
3	20	1	125	125	0
4	30	1	115	115	0
5	30	0	147	147	0
6	35	2	144	144	0

* Each test was flown by a different crew.

center becomes and the attendant problems of being led to install the equipment and supplying power for sets can be avoided when DME is installed. It tells the pilot how far the report is with an accuracy "equal to looking out of the cockpit." PAA Inc. reports that Model NAV-5 interceptors is designed for an accuracy of 1 vertical mile at 100, whatever is greater. This means that at a distance of 10 miles, the set's range accuracy is 1 mile.

Two significant terminal facility improvements and improvements made possible by DME are "orbiting," a completely new procedure, and better, more accurately controlled holding patterns. The latter have the additional advantage of being easier to fly than customary patterns from the pilot's point of view.

► Orbiting—This new approach maneuver, made possible by DME, enables a pilot to fly a circular course at

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accurately as a straightaway VOR radial. An advantage added is from by utilizing a parallel heading into the instrument, then turning the vertical needle of the instrument holding onto cross-pointer indicator centered in exactly the same manner as flying the heading beam on an ILS approach.

Pilots who have flown relative air courses report that it is "very flexible." The approach seems safe and practical to a ceiling maximum of 500 ft. and 1 mile visibility. Accuracy of holding is indicated in the accompanying table, which shows that the maximum deviation during cross-approach tests with aids from the VOR DME station varying from 7 to 23 miles was 0.4 miles, maximum was zero miles maximum average deviation was 0.355 miles and maximum average deviation was zero miles.

Here is an example of advantage of holding. At Cleveland, the VOR/DME station is just east slightly south of the metropolitan area, while Cleveland Airport is east and south of the city. 23 actual miles distant. So planes flying from station to airport (on a 360 deg heading) created a more accurate and possibly hazardous approaches were made directly over the city.

With DME, a plane can fly over the station and maintain a heading of 40 deg. Then take the right course of Cleveland, out over the lake. Altitude is 2,800 ft. When DME shows the pilot that he has proceeded 21 miles from the station, he executes a clockwise turn to the right and starts holding down. When plane has made approximately a 90 deg turn, pilot discontinues flying a fixed heading, instead he initiates a circular course which keeps him at a constant 21 miles from the station. He is then on top of a circle centered at the station. In the meantime, the VOR course-bearing selector has been preset to 70 deg.

Result is that when the VOR is active's vertical needle is centered, plane is directly over the airport.

It is this holding procedure that would allow corporate and private aircraft, equipped with the Hushline 3510 DME set, to make instrument landings at hundreds of fields heretofore usable only during visual flight (VFR) conditions because they had no ILS or ground controlled approach facilities.

• **Better Holding Procedures**—The FAA flight illustrated clearly how VOR/DME equipment allows pilots to fly holding procedures with greater precision and ease than the conventional variable timing stage intersection and timing facilities. Here is what FAA found.

- Patterns can be flown on basis of radial distance covered rather than on a time base of one or two minutes.
- Airspace will be used more economic-

ally, because aircraft can hold anywhere within the scope of the VOR/DME station instead of being limited to range intersections and timing facilities.

- **Tighter, more precise patterns** can be flown since pilot has continuous bearing and distance information available.
- **Holding, Pattern-in**—At least three types of holding patterns can be flown.

• **Basic track pattern**—Here an aircraft can fly on a VOR radial for a predetermined distance measured on DME. Then a procedure 180 deg turn is made and a parallel reverse course followed for the same distance as the inbound segment. Another 180 is made, and so on, until station is cleared to exit station is to land.

• **Two radial procedure**—This slightly modified basic track procedure uses two different VOR radials for the sides of the pattern, producing a slightly egg-shaped circuit. It is somewhat less precise than the former pattern. It proved to be easy to fly at reasonable distances from the station using radials with a directional difference of 3 to 5 deg.

• **Modified two radial procedure**—Using radials 10 deg apart, this pattern is reasonably easy to fly, but appears to have limited or no traffic control application, according to a CAA report.

The report says, "Satisfactory results were obtained by all the crews piloting using the revised holding patterns. The radar observers reported tight and exact patterns, even though some of the tests were flown with 40-knot crosswinds."

• **Must for Jet-PAW officials** have well in focus the many area problems that will arise when the 740 mph de Havilland Comet is in use and into operation. DME, they feel, will be a must. British Overseas Airways Corp., first commercial jet operator, appears to concur in this opinion.

Wheeler cited three advantages of DME as an en route facility that will be valuable to jets:

- **More accurate navigation**—Since DME permits an aircraft to be categorized a little more accurately than is otherwise possible, en route times are slightly reduced. In jet operation, the saving in fuel consumed is especially important.

• **Power navigational facilities**—Since CAA intends to install over 400 DME stations in this country alone, it is quite possible that many radio navigation circuits could be eliminated.


• **Terrain**—An aviator using the DME is "Never let down until you know where you are." Result is that when flying over mountainous terrain under IFR conditions or at night, pilots may stay at an exact altitude until directly over destination. Then a fine controlling altitude is made. Such procedure

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applies particularly to international communication who fly into acoustic signals equipped with a minimum of navigational aids.

However, with DME supplying the pilot with continuous and accurate readings of his distance from destination, he can safely let down step by step as the terrain below him recedes, saving time, fuel and money.

► Then a DME—To give the pilot a continuous indication of his distance from a VOR/DME station, the air beacon interrogator transmits a series of radio frequency pulses. Received by the ground station transponder, the pulses come in automatic transmission of a series of reply signals.

When received by the interrogator, that unit derives distance information from the time difference between interrogation and reply. This information, the direct range between aircraft and ground station, is automatically and continuously fed into a standard 1-in. accuracy instrument, the needle of which shows the pilot's position toward or away from the ground station.

In the Bendix equipment, the interrogator's quartz wire, such antenna is small, less than 3 in. long, and may be mounted in any convenient location on the aircraft.

A direct-reading frequency selector in the cockpit permits the selection of 100 DME frequency channels. Usually one Bendix-type MN-81 control panel operates both the VOR receiver and the DME interrogator, since all DME stations are actual VOR locations. Tuning the VOR to the desired station automatically tunes the DME interrogator to the correct channel. Lighting for the control panel is Bendix' Di-Nite system which gives maximum white light in daytime and red light at night.

► Nonrecurrence & Specifications—Bendix' Model 1806, the Bendix NA-5, is called the Model DME Ambient Interrogator by CNA. Last year, including accessories is \$7,000.

Model 1820 weighs 11.25 lb., compared to Model 1818's 22.75 lb. The 1810 consists of two packages, a power supply measuring approximately 10 1/2 in. x 6 1/2 in., and the interrogator, whose dimensions are about 1 1/2 in. x 1 1/2 in. x 1 1/2 in. The power supply is about 50% less than DME.

For American engineers make this comparison between the Federal ambient DME set (called DME) and the Bendix NA-5. The Federal unit is installed in a size ATX chassis, the Bendix on a 4 ATX. The Federal unit uses 60 tubes, the Bendix 27, in accordance would presumably be simpler on the Bendix.

Pilot preferred the Federal Verber Best instrument presentation at distance information to the Bendix did



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All LEWIS thermocouple indicators are fully oil-proof and temperature, magnetically shielded and are available for use with iron-constantan, copper-constantan or chromel-alumel thermocouples in all standard ranges for the thermocouple material used. A few typical ranges are listed below.

MODEL 176, 2½" case in ANO 15017
—50 to +1300°C Cylindrical Temp.
(AN 5239-1A or T1A)
—80 to +1300°C Sweeping Temp.
0 to +1300°C Exhaust Temp.

MODEL 196, 1½" case in ANO 15013
—80 to +1300°C Cylindrical Temp.
0 to +1500°C Exhaust Temp.

MODEL 216, 2½" case in ANO 15011
—50 to +1300°C Cylindrical Temp.
(AN 5239-1A or T1A)
—80 to +1300°C Sweeping Temp.
0 to +1500°C Exhaust Temp.



MODEL 176



MODEL 196



MODEL 216

RESISTANCE TYPE

Accuracy, uniformity, these LEWIS resistance indicators are remarkably free of voltage errors, have nearly linear scales (not crowded at the ends) and are magnetically shielded. A few typical ranges are given below. Not shown is Model 45R, 2½" single.

MODEL 49L, 1½" case in ANO 15015
—70 to +120°C AN 5710-6 or AN 57107
0 to +120°C Oil Temp.
—30 to +80°C Air Temp.

MODEL 57L, 2½" case in ANO 15011
—70 to +120°C AN 5710-6 or AN 57107
—10 to +250°C Oil Temp.
—180 to +1300°C Cylindrical Temp.



MODEL 49L



MODEL 57L

FOR MORE DETAILS SEE LEWIS THERMOCOUPLE AND RESISTANCE INDICATOR BROCHURES
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Manufacturers of Complete Temperature Measuring Systems for Aircraft

power system. They said the Vooder indicator was more in interpret and could be read to four tolerances. Ben's efforts are there would be as push him to equip the Navy with a Vooder meter.

If a power or other type failure occurs in the Federal unit, it means the pilot that something is wrong by "reading" simply. Reading means that the Vooder indicator rotates at a considerable faster rate than when taking oil readings on normal operation. The Vooder instrument has a sun disk mounted at mid-whisker, clock and flag which shows as a window to note that something is wrong. The needle on this instrument also swings for failure.

Ben's Vooder Communication Division is now installing on NAAI as a company Van Sleds. After preliminary flights, the plane will be used to give a series of demonstration flights at several major aviation centers throughout the U. S.

Federal spokesman told Avionics Week that its airborne equipment, called "intelligent computer," is being tested by United, American, Trans World, Pan American, Capital, Eastern and Northeast Airlines.

For American officials credit Charles H. Moore, former CAA administrator, with actively pushing DME into its acceptance.

AF to Test New Jet-Resistant Runway

Service tests of flight engines and runway constructed of coal bitum rubber concrete will be made this summer at several U. S. Air Force jet bases.

Present asphalt concrete systems and bitum rubber have proved inadequate because of the damaging effect of jet aircraft fuel. In current ground operations and servicing of jet aircraft, spillage of kerosene type jet fuels on patches on the paving and does not evaporate quickly.

USAF has found that the fuel enters into the top wearing course, dissolves the asphalt and leaves crumbled areas exposed. The store often is blown away by blast from jet engines. Fuel Test—Air Force engineers point out that spilling and bitum rubber built at portland cement are not affected by jet fuel.

Construction is to begin about May 15 on the first complete experimental runway concrete runway at Davis-Monthan AFB, Tucson, Ariz.

In laboratory and specialized tests conducted thus far, coal bitum rubber concrete has proved most satisfactory, engineers report. Tests were made of the concrete, asphalt mixed

with natural rubber and the tumbler compound.

Davis-Monthan AFB, now under reconstruction in line with Air Force's current expansion program, has been selected for test of the experimental concrete in a hot, dry climate. Five other bases have been selected in representative of various other climatic regions of the U. S. Testing areas will be constructed of tumbler concrete at Houston AFB, Miss., Laredo AFB, Tex., MacDill AFB, Wash., Santa Hill AFB, Kans., and Walker AFB, N. M.

Each of the tumbler runways will be in single areas or taxiways of from 20,000 to 30,000 square yards of concrete.

R-54C fighter interceptors to be based at Davis-Monthan will test the new pavement under routine jet operating conditions. The new area, at the field should be in use by Aug. 15, engineers say. It will be composed of a 24-inch binder course of asphaltic concrete with a top wearing surface of 12-inches of coal bitum rubber concrete.

Part of the proposed Davis-Monthan experiment, AF engineers conducted patch tests on a thousand-foot strip of runway at the recently worn runway of Hurler AFB, Ok., in March 1952. Extensive tests followed last summer at the Air Force testing laboratory at Vicksburg, Miss. Further patch tests will be conducted at Pease AFB, Me.

Meanwhile, parking aprons, taxiways, with such areas where clearing, drainage, major asphaltic concrete, and a thousand-foot strip at each end of base runways are being built of portland cement at all permanent Air Force installations where these areas could formerly be paved with asphaltic concrete.

Pinball Machines Help B-47 Testing

Pinball machine parts are incorporated in an expansion drive developed by W. H. Tyger of the Georgia Division of Lockheed Aircraft Corp. to check the wiring of B-47 Stratojets.

Tyger, electronic functional test specialist, took the relay from a pinball machine and built the checker, which is portable, simple, and easy to keep in working order. It has cut the test inspection time for one circuit in the B-47 electronic system from an eight-hour job for two men to 30 minutes for one man. The device costs \$65 in materials and the time of three men for a week, against \$6,000 for a standard tester.

The standard device is manual while the Lockheed instrument is fully auto-



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Exciter	AY-106-1	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Receiver	AY-106-2	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Signal Source	AY-106-3	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Detector	AY-106-4	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Reference	AY-106-5	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0

***Note: These series cannot be compared.

AY-106 SERIES									
	Type	Input Voltage (Volts)	Input Current (Milliamps)	Load Voltage (Volts)	Load Current (Milliamps)	Output Voltage (Volts)	Output Current (Milliamps)	Resistance (Ohms)	Maximum Power (Watts)
Exciter	AY-106-1	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Receiver	AY-106-2	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Signal Source	AY-106-3	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Detector	AY-106-4	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0
Reference	AY-106-5	240-250	1.0	240-250	1.0	240-250	1.0	240-250	1.0

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Faster than many jet fighters, the Douglas A3D-1 can lift a heavier bomb load from an aircraft carrier and deliver it farther than any known plane.

First swept-wing jet attack bomber ever built for the Navy, A3D-1 is in the 600 to 700 mph class—and can operate

on missions at 50,000 feet. Key to its speed, range, and striking power is the simplicity and lightweight strength of its Douglas structure—which has already become a spinboard for new configurations. A3D-1 has passed its early flight tests, and is already in production

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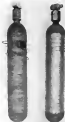
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radio. It will pinpoint shorted wires. After the device is connected to a 50 wire cable, it requires only five seconds to check the cable for continuity and four seconds per wire to check for shorts.

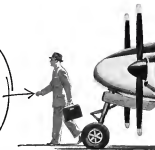
It is applicable to any electrical system using multiple wire cables, and can be used for telephone and other communication systems. The device also checks and the new circuit for faults. It uses 28-volt d.c. current and requires but .003 amp. for testing.



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What happens to a metal bottle containing liquid or gas under pressure when hit by a 1500-lb. slug is shown at left, above. Walter Kohn & Co., makers of such bottles, wraps them with piano wire to prevent the cylinders from shattering when hit in sudden accidents. One of every 240 bottles is period off. Kohn's production line end, per to the test on the company's flying range at its Belleville, N. J., plant. Should cylinder prove to be defective, live ones of the same kind are tested. If any of these are faulty, the whole batch is returned for reprocessing.

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the wire lead. A piece not a dropped over the end of the hose and seats against the edge of the Neoprene cone. An interlocking cone fits inside the glass out, over the wire lead. The hose head is placed against the middle of the cone by a tapered metal which is forced into the inner tube of the hose and expands the hose outward to lock with the cone. The whole assembly is secured in place when the wire end is threaded into the sleeve.

Bowden has also announced contribution of a separate Flexible Pipe Company to market the company's flexible pipe direct to customers. The firm claims to be the largest manufacturer of high pressure hose in Great Britain. Flexible Pipe Division, Bowden, Ltd., Wilkeson Junction, London, N. W. 11



Airborne Generator

A small induction a/c generator developed by Aeffersch provides to reduce weight and bring greater simplicity and reliability to aircraft and marine electrical power systems. The generator is simple in main production.

The company says the unit, a rope drive-driven type, is the smallest of its rating ever built.

The new generator weighs only 45 lb., has an 800-watt output and provides 115/200v, 3-phase, 400-c. current. It is about half the size of an automobile generator.

The new power supply requires no voltage regulator, or external source of a/c or d.c. voltage to short-circuit it into building up. Aeffersch says it is required at the factory and on for their external excitation is needed, except that provided during operation by a simple short-circuited capacitor bank, the only auxiliary equipment.

The unit can also serve as a motor, making it especially valuable in remote applications, the company points out. It can transfer the entire engine power supply up to speed prior to launching—driving hydraulic pumps, or conditioning fans, energy storage flywheels and other accessories. It may be used to bring up speed the turbine which will drive it when idling, providing a smooth transition, without transfer delay, from external to internal power supply.

Wiring and other more problems are avoided as there are no electrical connections to the rotor. Without brushes, the machine is adaptable to

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high-altitude operation. The absence of slip rings, rotating windings and relay age regulators also contributes to greater reliability, the fact noted.

Engineered operation with low voltage source are obtained with a small, lightweight rotor. A high degree of accuracy is obtained because it is dependent not so much on rotor size as on the number of excitation capacitors used. Addressers any.

The design also provides inherent short-circuit protection. If the generator is started, so are the excitation capacitors. Recovery time after removal of a short is said to be 6 1/2 sec.

After a load change, output voltage changes smoothly to new steady state value within approximately six cycles, according to the firm. The three-phase, high quality steel unit in the steel's static laminations simplifies cooling problems.

The new generator can withstand 50G shocks and 40G accelerations, tests show.

It reportedly meets voltage and tolerance requirements of MIL-G-8099 with a margin of 60% or better. Another model of the same design but of higher capacity weighs 29 lb. and has a 4-lb.-watt output.

Addressers: NRG Co., 9551 Sepulveda Blvd., Los Angeles 45.

ALSO ON THE MARKET

Double-end tube deburring and filing can be performed on both end-knurling machine by one man. Automatic sliding from his hands for loading and unloading—Pneum Engineering Co., Inc., 681 Walnut St., Aurora, IL.

Extension and check accommodations standard drills for long reach jobs, increasing need for bending drill to rad or use of costly special length drills—Bever Tool Co., Box 185, Huntington, L. E. N. Y.

Textured polyethylene rope doesn't sink and is constructed by melt extrusion and is immune to acids at -70°F. can be used for bicycles or ordnance cables—L. S. Plaster, Inc., 2551 Spring St., Redwood City, Calif.

Simple deburring tool with manually rotating blade has been developed for speedy use for the removal of burrs from newly milled or rough and true for edge in plastic and metal parts—Creative Research, Inc., 3063 Wilshire Blvd., Beverly Hills, Calif.

Owing grooves with 31/64- to 42-in. diameters can be tapered tubes and cones to close tolerances with new full indicator work 900-in. scale graduations, useful for checking out-machined male diameters, tapered and other openings—Reliance Industries, 4907 Plumtree Blvd., South Gate, Calif.

Rubber-covered hydraulic hose for pressures up to 5,000 psi is reinforced with high tensile steel wire to give maximum flexibility and burst resistance under shock loads through temperatures of -40 to 250°F.—Quaker Rubber Corp., 1932 Oliver Bldg., Pittsburgh 32, Pa.

Compact Yellow piston and BAW Series 9-11022 for hydraulic system components can be used where small amounts of leakage are permissible. Seal is responsive to heat irregularities, has little shaft during pressure reversal and is designed to keep friction at a minimum. Consisting of two identical Keel-T-11 (Piston) rings and centrifugal seal ring, and accommodates dimensional changes caused by heat and pressure—W. S. Sherman & Co., 11417 W. Jefferson Blvd., Culver City, Calif.

Triple-lead Glasshouse tester has been developed for testing ground, open or shorts in live and dead circuits. It tests virtually all types of circuits for continuity and resistance of 0.01 ohm to 10 megohms—Deke Electrical Supply Co., 1415 E. Walnut St., Pasadena, Calif.

FINANCIAL

Aircraft Interim Earnings

Three Months Ended Mar. 31*

Company	— Gross Sales —		— Net Income —		Per Common Share	
	1955	1954	1955	1954	1955	1954
(000 omitted)						
Beech (1)	848,734	109,300	8715	3521	14.70	21.36
Boeing	35,896	24,274	887	363	1.14	1.27
Boeing	356,656	187,535	3,464	1,964	2.18	1.15
Consolidated Vultee (2)	95,255	88,564	1,561	1,458	5.6	6.3
Curtis-Wright	56,762	17,623	2,446	1,716	2.18	1.18
Douglas (3)	221,658	11,461	4,269	1,991	5.6	1.66
Fairchild	29,117	21,068	896	541	3.3	3.4
Lockheed	124,650	45,946	2,569	1,468	1.39	1.27
North American	29,730	29,552	1,754	1,045	8.0	3.8
North American	149,514	48,297	5,455	1,466	7.7	4.6
McDonnell	36,303	32,377	323	129	1.29	1.16
Northrop (3)	43,800	47,282	432	431	6.7	5.8
Republic	97,567	44,423	1,962	1,357	1.72	1.35
United	262,896	144,755	5,380	3,745	7.1	5.07

NOTES: * Except the following: (1) Six months ended Mar. 31; (2) quarter ended Feb. 28; (3) quarter ended Jan. 31. (3) Boeing.

Aircraft Earnings Continue Climb

But short-term reports, such as those analyzed here, indicate trends rather than final results.

Sales and earnings for the aircraft industry are rising, substantially (here, based on a year ago), with preceding trends indicating that reported sales and earnings for 1955 will probably establish new peaks for the postwar period.

The accompanying American Wings compilation of various authoritative sources shows how aircraft builders did.

►Trends, Not Trends—The results are by no means exact or conclusive, particularly when certain periods contain some extraneous elements that are usually found in annual accounts. The contrasting nature of the business, as repeatedly pointed out here, covers a wide variety of operating costs a great deal of time, introducing a number of accounting discrepancies that are not fully known for some time.

Nevertheless, a trend of results is clearly discernible in current reports. Of course, the usual qualifications concerning the impact of excess profits tax and amortization also surround the reports.

►Earnings—Most companies continue to report earnings subject to the full impact of excess profits taxation. It is becoming increasingly questionable that this tax will lapse on

June 30. If it does, current earnings (where full EPT payments have been made) are obviously understated.

The full measure of subsequent adjustments "correcting" that portion of earnings previously written down by EPT will depend on varying degrees, as to whether the company involved is on a calendar or fiscal year basis. A company reporting on a calendar year basis will be subject to a 10% rate, while those with a non-calendar fiscal year will be affected proportionately less (American Wings May [6, p. 56]). Reduced earnings will, of course, be determined in kind and sometimes may be the price of underestimation and irregularities are considered.

But has revealed that if EPT expires, do not earnings for the first quarter will be increased by more than \$75,000 or eight cents a share. On the other hand, Convair has already announced the change of EPT, making no provision for the tax. An additional tax liability of \$91,000 will accrue if this report does not lapse.

►Sales Base—The accompanying table reveals that, with the exception of only Martin and Northrop, sales are up sharply for the 1955 first quarter as

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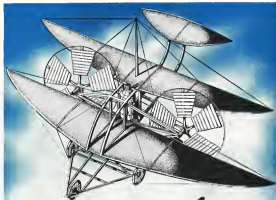


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- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you advised employees of your company's plan of recognition?
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- ☐ Have you encouraged a Greater Budget-Congratulate your company?
- ☐ Have you set up lists of volunteers on their official place can be made for scheduling donors?

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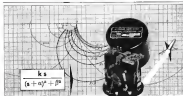
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compared with the 1952 like period. Without exception, reported earnings are up, in most cases by well over 100%.

Meritor, not being subject to any laws, showed the most startling earnings contrast. While sales for the company's first quarter remained virtually unchanged at around \$13.7 million, net income amounted to \$1,734,000 for the 1953 first quarter, compared to a deficit of \$270,000 for the like 1952 period.

Danaher reported the widest jumps in sales and earnings for the first quarter. But a large element of this increase is due to a special accounting treatment.

The company reveals total sales of more than \$116 million for the three months ended Feb. 28, 1953, up some 105% over the \$51.5 million of the same 1952 period. Reported net earnings are credited at \$4,399,757 for the current quarter, more than twice the amount shown for the comparable period last year. Current earnings can be improved further if EPT is killed in current tax positions of \$1,211,000 would be returned to net income.

Sales for the current quarter were accelerated through a change in the form of one of Danaher's major contracts, resulting in addition of \$45,610,000 to sales for the current quarter. Presumably, earnings benefited accordingly.

In the absence of further data, it appears that the company has now started to show higher sales and earnings during the earlier phases of its military contract work, rather than wait for completion of these commitments.

This policy may be difficult to understand, as from a tax viewpoint the company could be better off to defer income, for another year or so. Moreover, with restrictions and cutbacks indicated in the aircraft procurement program, there is always the possibility that sales and earnings may be anticipated too soon.

The explanations for this change designed to show more immediate further earnings may be found in the opinion of 66,093 shares awarded Danaher's stock in 1951, now fully effective.

The Danaher change appears to be in the same pattern as that adopted by General in 1950 when it selected its method of accounting for not pay-back the contracts to record sales and profits on the basis of expenditures made and work performed. Prior to this change, sales and profits under such contracts were not taken into account until the time of delivery of the completed products. The General change caused increasing its 1950 earnings by \$2.1 million.

Changes of this nature further reveal how lenient reported results are for interim quarterly periods or even as year-end as 12 months. It is always desirable to view results even a series of years for proper perspective—Belle Albrecht



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AIR TRANSPORT

First Quarter Airline Earnings

	1951 (000,000)	1952 (000,000)	1951 (000,000)	1952 (000,000)
American				
Ops revenue	\$44,504	\$39,305		
Net ops income	3,064	2,775		
Net profit	3,083	303		
Boeing (Domestic)**				
Ops revenue	2,003	6,626		
Net ops income	(443)	17		
Net profit	+	465		
Boeing (International)**				
Ops revenue	2,234	3,849		
Net ops income	(204)	(175)		
Net profit	+	(476)		
Capital				
Ops revenue	8,249	7,754		
Net ops income	(144)	(1,791)		
Net profit	(243)	(1,682)		
Delta-CGS (Domestic)**				
Ops revenue	10,124	10,639		
Net ops income	3,465	1,873		
Net profit	299	532		
Delta-CGS (International)**				
Ops revenue	1,092	3,223		
Net ops income	305	351		
Net profit	53	165		
Colonial (Domestic)				
Ops revenue	1,453	1,095		
Net ops income	1	(753)		
Net profit	7	(775)		
Colonial (International)				
Ops revenue	499	279		
Net ops income	10	(94)		
Net profit	10	(94)		
Cockfield				
Ops revenue	2,491	3,942		
Net ops income	36	86		
Net profit	681	97		
Eastern				
Ops revenue	19,672	19,522		
Net ops income	7,530	6,655		
Net profit	5,626	5,946		
Flying Tiger				
Ops revenue	1,710	1,084		
Net ops income	57	(313)		
Net profit	213	364		
Norfolk				
Ops revenue	11,001	8,775		
Net ops income	5,114	2,084		
Net profit	1,214	1,521		
Norfolk				
Ops revenue	\$1,127	\$1,201		
Net ops income	(103)	(455)		
Net profit	(101)	(451)		
Norfolk (Domestic)				
Ops revenue	5,181	7,027		
Net ops income	(1,465)	(1,355)		
Net profit	(1,127)	(1,364)		
Norfolk (International)				
Ops revenue	4,002	5,578		
Net ops income	(720)	(725)		
Net profit	(166)	(740)		
Panagra				
Ops revenue	4,496	5,062		
Net ops income	720	184		
Net profit	946	185		
Pan American (Continental)				
Ops revenue	45,874	40,480		
Net ops income	(1,559)	(1,470)		
Net profit	(465)	(537)		
Reifel				
Ops revenue	194	494		
Net ops income	12	81		
Net profit	12	81		
Shaw				
Ops revenue	2,432	2,086		
Net ops income	(161)	24		
Net profit	463	13		
TWA (Domestic)				
Ops revenue	20,615	22,452		
Net ops income	(412)	(12)		
Net profit	531	(379)		
TWA (International)				
Ops revenue	20,512	18,295		
Net ops income	(2,740)	(355)		
Net profit	(1,058)	(403)		
United				
Ops revenue	16,157	16,797		
Net ops income	1,099	2,187		
Net profit	340	655		
Western				
Ops revenue	6,876	5,138		
Net ops income	273	193		
Net profit	60	117		

Source: Quarterly earnings from 1941, Schedule H reports to CAB. *Includes 1951 and 1952 for comparative purposes. **Includes 1951 and 1952 for comparative purposes.

Trunk Airline Business Boom Continues

By Lee Moore

Airline business continues to boom this year, as *AVIATION WEEK* survey of agency carried first-quarter reports to Civil Aeronautics Board show. Total revenues of the domestic trunk airlines grew 20% to more than \$200 million the first quarter of this year, and net profits almost tripled the first-quarter showing of a year ago.

Major international routes lost approximately \$1 million overall during last quarter of this year and lost. Many of the routes still are an temporary and sales, and CAB denies on final rates may bring most of the international back into the black, both currently and retroactively, despite the real seasonal slump of the first quarter.

All-cargo lines report an estimated \$1 million more income for the last quarter of this year than in 1952, but nonoperating profits continue to be merged. First quarter financial results are shown in the accompanying table. Retroactive changes not included in the accounts are explained in the accompanying summary on each airline. American operators show seasonal growth in this perspective period.

trained to cover service to Argentina, Bolivia, Brazil, Ecuador, Finland, the Central Zone and Peru.

■ Pan American World Airways record sale of more Colson stock. Again TAA share of the Colson National Airline from 1975 to 1976. Pan Am's stock acquired cost of the 49% equity as of last Dec. 31 was reported at \$410,000.

■ First B-747, 1,666 passengers, 19,777 of them adults, out of Berlin during April, 1,297 more than the airline carried in March. Flights were flown to trips near Hawaii, Frankfurt and Hamburg as a record for the airline.

■ **Sabena Belgian Airlines** is operating three first-class flights weekly and its weekly second-class flights, largest number in the carrier's history, between Belgium and the U.S. Sabena has 552 seats available weekly on its most capacity route, 735 more than its last capacity last summer.

■ **Transport Air Group**, association of freight agencies, scheduled a board meeting for June 1 to discuss expansion of TAC's technical activities, especially in reference to the Carfax C-86 air prepayment program.

■ **United Air Lines** has named its new Commercial executive plane the "Mainliner O'Connor" after UAL stewardess in charge of special flights, Mary O'Connor, who has more than 4,500,000 airlogged.

CAB ORDERS

Pan American World Airways granted one extension of permit to fly nonstop from Illinois, Ohio to Tijuana. This allows granted flights to end at border only. May 15 order No. 17394.

Texas Chamber of Commerce granted permission to introduce in Texas Pacific and West Coast Airlines route, second class, Long Beach then to and from county of Riverside in the West Coast. Order May 15, 17393.

Trans World Airlines given immediate certificate permitting local Rio Piedras Airport service as a replacement for CAA May 15 decision (order No. 17394).

New York Airlines through service per order of U.S. South America interagency to general authority. President Eisenhower's return of the case May 14 has more on order on grounds that a considerable time had elapsed since testing in 1955. May 15, 17392.

Interline agreements of United, South west and other airlines approved. May 15, 17391.

Large air service application for certificate denied on request of carrier. May 15, 17389.

Breidack & Motters Airlines granted exemption for low smoking passenger flights New York-Boston June 20-Aug. 15 by

exemption with city of Harris, Georgia May 15, 17388.

American City of South Island carrying two to 24 days a month. South Island is peak summer season on grounds that work and carriers have permitted to meet all needs for service. May 15, 17387.

Southern Airways granted permission to start serving Norfolk, Va. June 1. May 15, 17386.

Flying Tiger Airlines request exemption to transport Paul H. Hooton on its regular schedule to Atlantic City. May 15, 17384.

CAA complaint against John F. Callahan for violations as records a pilot with some less already having trouble through his due to 20 days a month on grounds CAA took on July 20, 1971, when Callahan certified it on month previous. CAA Board says CAA has not established adequate "product of evidence" of violation of CAA to Register. May 14, 17383.

Cherokee Air Service filed ground suit on schedule and pay of \$1,200 for operation May 21 July 6, 1971. Second (exchange) May 14, 17382.

Bonanza Air Lines petition to request and accept first stage into rule out of Sept. 25, 1972, denied when company month previous to schedule "denied" to come "rehabilitated" within 10 days. May 14, 17381.

Northern Consolidated Airlines complaint against schedule from filed in Pacific North west dismissed. May 14, 17380.

Indiana & Western denied permission to fly a route of Chicago from Miami, City states to New York May 25, on grounds that TWA also is willing to provide the service, CAA policy when a passenger that has been in operational grounds in long as a certificate order is willing to take the job. May 14, 17379.

Delta Air Lines request of service to Longview, Illinois-Chicago Airport. Two proposed by CAA to long as Trans World Airlines serves it. Investigation ordered. May 14, 17378.

Trans World republishes expedition between Ft. Worth and San Angelo. Two-mile Powers to launch certificate amendment to this year's air transport order authority. May 14, 17377.

American and Eastern Air Lines petition of changing first class on path of routes flights per order arrangement as possible irreversible or denominated. May 14, 17377.

General passenger law investigation denied at request request and a mail service submitted for business (transit) Order May 25, 17376. May 14, 17375.

Flying Tiger Airlines request exemption of consolidation of other routes by American and UAL denied on grounds that would be adding request scope and delay disposition of the case. May 15, 17375.

North Central Airlines certificate amendment application of Central Florida N. D. for service to that city denied. May 15, 17374.

American Airlines certificate amendment proposed by South America and AA to left section on Dallas-Ft. Worth-Boston service denied. May 15, 17373.

Audrey Flying Service and Cadet Air Lines, Houston to two agencies, exemption to give regular service on route to be considered carrier received for another year. May 12 & 17372.

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Support Crash Injury Research

Washington budget-cutting and talk of getting more out of every federal dollar spent raises the possibility that some vital activities may be chipped off or crippled simply because their returns have not been sufficiently publicized or appreciated by top policy-making officials.

One little group which has persevered successfully in the commendable objective of saving human life is the Crash Injury Research project of Cornell Medical College. Everyone should know more about its work.

There now is almost universal acceptance of the value of accident prevention. But the Crash Injury Research project has gone a significant step further—it works to reduce the toll of injuries and deaths in those accidents which do occur. Its accomplishments are impressive, and it has proved that greater achievements are attainable in the future if it can be allowed to continue its mission.

Crash Injury Research was established in 1942, under its present director, Hugh DeGroot, and operated until the end of the war with funds provided by the Office of Scientific Research & Development. During this period, members of the project worked directly with the Navy and Air Force to establish painful crash-injury studies by military groups. More recently, mutual support has come from the Office of Naval Research, the Air Force, Army, Navy and Civil Aeronautics Administration.

This project set up at Cornell Medical College the first acceleration-deceleration facilities for testing dummies. It built the first dynamic testing apparatus for 40G tests. It developed an inertia lock for military shoulder harness. It arranged a forum for discussion of civil and military safety problems at five crash injury research conferences held at the National Academy of Sciences under the auspices of the National Research Council.

But even beyond these contributions, the project—working with other divisions of Cornell University through the Cornell Committee for Transportation Safety Research—has been directly responsible for a widespread stimulation of design and engineering thought which has led to a growing realization by engineers that safety in aviation must also include the protection from injury in crashes.

Using crash-injury findings from previous accidents, engineers have achieved a valuable increase of safety by devising structures and installations which reduce exposure to injury in survivable accidents.

CIR has worked extensively with civilian aircraft design. However, its findings—that human structures and aircraft structures are adequate the force of severe

crashes—have directly complemented the excellent safety studies conducted by the Directorate of Flight Safety Research, the Aeronautical Laboratory, and the Office of the Surgeon General of the Air Force, as well as studies by the Flight Safety Division of the Office of the Chief of Naval Operations and the Navy's Bureau of Medicine and Surgery.

The design of crashworthy seats, personnel, agricultural and executive aircraft has substantially contributed to safety in "off the shelf" liaison and light transport aircraft now used by the Army, Navy and Air Force.

It has contributed to increased safety in large transport planes, as well. One notable example is the major advance in controlling passenger seats, attachments, and safety belt installations which have been the direct result of observations on the dangers set up by steel seat backs in small planes.

The effectiveness of new designs is forward during tests now being studied by the project for comparison with accident injury data on the safety of noncrashworthy seats based on data from British civil and military experiences as well as from other sources.

CIR's stimulation of research on problems of impact, energy absorption, crash force recording, kinematic effects of the body on safety belts and measurement of force in controlled crashes, has contributed to an interchange of concepts, studies and findings which have served effectively in increasing the safety of military and civilian flight.

Although the engineering art of providing protection in accidents is still young, there is a great evidence of the effectiveness of CIR's project in recent extension of crash injury studies designed in aviation to the automobile field where many of the measures now used to give more safety to aircraft accidents can be applied in passenger automobiles.

Despite CIR's harvest, engine systems to save life for civilians as well as military personnel, and in ground vehicles as well as in aircraft, this project-like all government-sponsored research programs working under the "free use act"—lack any assurance of funds for long-term continuation.

A short-term policy for long-term, effective safety research is no more in accord with good business practices of government than short-term, sporadic efforts and slumps in our vital military aircraft production program if our national welfare is to be promoted at maximum efficiency and effort.

Crash Injury Research Project awaits the continued support of its federal sponsors whose foresight has already contributed to CIR's effective return in the saving of human life.

—Robert H. Wood

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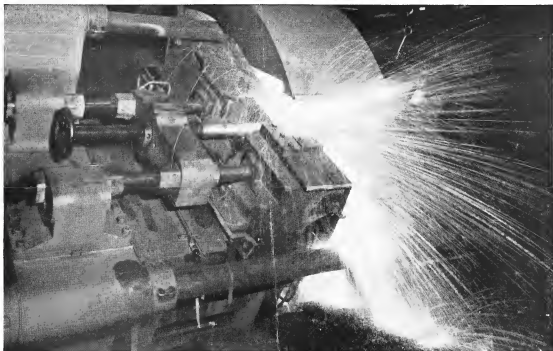
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